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BRIEFLY TOLD.

A CORRECTION.—In the JOURNAL for last week (p. 882), under the heading "Mr. James Somerville Dissents," Mr. Somerville is reported as having said: "Mr. Egner evidently thinks that a gas containing 300 heat units is just as valuable to the consumer as one containing 670." Mr. Somerville really wrote, 500 heat units instead of 300.

DEATH OF MR. WILLIAM R. PLUNKETT.—A correspondent writing from Pittsfield under date of the 7th inst. forwards the following respecting the history of Mr. William R. Plunkett, for many years prominent in the affairs of the Pittsfield (Mass.) Coal Gas Company: "Mr. William R. Plunkett, 72 years old, died this evening at the residence of Mrs. E. H. Kellogg, where he and Robert S. Francis were visiting. About 9:30 he complained of feeling ill and he was laid on a sofa, where he expired about 15 minutes later. Dr Henry Colt, medical examiner, was called and pronounced death due to heart failure. Mr. Plunkett was one of the most respected and leading citizens of Berkshire county, Mass. He was born in North Chester, Mass., and with his parents moved to Pittsfield in 1840. He was educated in the public schools of this city, the Andover preparatory school, the Harvard law school, and studied several years at Yale. He was admitted to the bar in 1855. He was Counsel for the Berkshire Life Insurance Company and its President since 1878. For more than 20 years he was President of the Pontoosuc Woollen Company, founded in 1840, and the oldest woollen mill in the United States. Mr. Plunkett was Treasurer and Secretary of the Pittsfield Coal Gas Company, Vice-President of the Agricultural National Bank, of which ex-Governor W. Murray Crane is President; President of Trustees of the Berkshire Athenaeum and Museum; Director and Counsel for the Pittsfield Street Railway Company; Treasurer of the First Congregational Church; a leading member of the Pittsfield Park Club, and for several years was a member of the Legislature. He is survived by his mother, Mrs. Harriet M. Plunkett, President of the House of Mercy and a well known authoress; a brother, Maj. Charles T. Plunkett; two sisters, Mrs. J. W. Hull and Miss Harriet P. Plunkett; a son, Thomas F. Plunkett, graduate of Princeton last June, and two daughters, the Misses Elizabeth and Marion E. Plunkett. Mr. Plunkett lived for many years in the house occupied by Longfellow, the poet, and the clock which inspired his famous poem still stands in the hallway."

Since the above was put in type we received the following brief notes respecting Mr. Plunkett's career, from a man who knew him well: "Mr. William R. Plunkett, Treasurer of the Pittsfield Coal Gas Company, died of heart failure, the night of December 7th. The Pittsfield Coal Gas Company was incorporated in 1853, and Mr. Plunkett was elected Treasurer and Clerk of the Corporation in 1857, which offices he held without interruption to the present time. He had suffered greatly from a rheumatic trouble for a number of years, but recently seemed much better; in fact, it might have been said that he was enjoying quite good health. On the afternoon of his death he had visited the gas works accompanied by General Manager Ralph Woodward, and seemed as well and vigorous as he had been for some time. Mr. Plunkett had a host of friends in the gas fraternity, and any gas man was sure of a hearty welcome from him on coming to Pittsfield. The

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funeral was held the afternoon of the 10th inst., and was largely attended by citizens, business associates and the employees of the many corporations with which he was connected. In his death Pittsfield looses its foremost citizen and the gas industry a warm friend and able counsellor."

NOTES—

THE American Gas Light Association has appointed the following committee in respect of arranging with the Western and other Gas Associations for a Gas Congress at the World's Fair to be held in St. Louis next spring: C. J. R. Humphreys (Chairman), E. G. Cowdery, Irvin Butterworth, Walton Clark and Wm. McDonald.

MR. A. K. STEPHENS, formerly Superintendent of the Washington (N. C.) Light and Water Company, has been appointed Superintendent of the Nyack (N. Y.) Gas Light and Fuel Company.

MR. H. L. SHEPARD has resigned his position as President of the United Gas and Electric Company, of Dover, N. H. His successor is Mr. Thomas Hanken. Mr. George W. Welch was elected Treasurer.

MR. EDWARD A. Chapel, for some time connected with the electrical division of the Chelsea (Mass.) Gas Light Company, has been appointed Superintendent of the Nantucket (Mass.) Gas and Electric Company.

A CORRESPONDENT in Rochester, N. Y., writing under date of the 5th inst., forwards the following: "The employees in the mechanical department of the Rochester Gas and Electric Company met recently at the Hotel Bristol, to bid farewell to Superintendent C. E. Reynolds, who had announced that he had, after 18 years of service in the Company, decided to seek new fields, in the precincts of Boston. Mr. Reynolds has been during his many years of service pleasantly connected with the men under his control and it was with regret that they learned he was to leave them. Their meeting at the Bristol was to express their appreciation of his services by word of mouth and by a token of esteem in the shape of a diamond pin. Mr. Reynolds made such a reply as he could under the circumstances, and alluded to the happy relations existing between himself and the men under his supervision. There was an exchange of felicitations and then the assemblage dispersed wishing all success to Mr. Reynolds in his new location.

THE *Journal of Gas Lighting*, in announcing the death of Mr. Henry Aitken, of England, whose fame as a gas engineer was world-wide, says: "We regret to record the death, on the 21st November, at his residence at Darroch, Stirlingshire, at the age of 65, of Mr. Henry Aitken, whose name will be remembered by many of our readers in connection with the gas making process devised by him in conjunction with Mr. Wm. Young. The process was patented in their joint names on Aug. 3, 1875—rather more than 28 years ago—and was taken up by the West of Scotland Association of Gas Managers, now merged in the North British Association. A committee, consisting of the late Mr. W. Smith, of Helensburgh, Mr. J. M'Gilchrist, Mr. S. Stewart, Mr. R. S. Carlow and Mr. Levi Monk was appointed to investigate it; and they presented their report at the Lanark meeting of the Association in April, 1877. The importance attached to the report may be gauged from the fact that it gave rise to considerable discussion. The process was adopted at the Hamilton Gas Works, where it was inspected on several occasions early in the above named year by the late Dr. Wallace, who also reported upon it; and Mr. Aitken himself described it to a meeting of the Association held at a subsequent date. The object of the 'analyzer,' as the plant was called, was the enrichment of gas by carburation; and it was stated to be effecting it satisfactorily at Hamilton. The process was adopted in other gas works. Mr. Aitken identified himself with the West of Scotland Association, before whom, in 1878, he read a paper on the 'Influence of Aqueous and other Vapors upon Illuminating Gas;' while his colleague, Mr. William Young, who happily is still with us, has enriched the transactions of the existing Associations and gas literature generally by his valuable contributions."

THE proprietors of the Lowell (Mass.) Gas Light Company have applied to the Board of Gas and Electric Light Commissioners for permission to increase the capital in the sum of $200,000.

THE Massachusetts Board of Gas and Electric Light Commissioners has assented to the petition of the Gloucester Gas Light Company for the right to issue $150,000 new stock.

THE New Haven (Conn.) Gas Light Company has made an important purchase of land, hitherto occupied by the shops of the Mallory-Wheeler Company.

[ABSTRACT.—CONTINUED FROM PAGE 886.]

PROCEEDINGS, THIRTY-FIRST ANNUAL MEETING, AMERIGAN GAS LIGHT ASSOCIATION.

HELD IN DETROIT, MICH., OCTOBER 21, 22 AND 23, 1903.

FIRST DAY—AFTERNOON SESSION.

The next matter to occupy the attention of the Association was the paper, by Mr. Arthur Graham Glasgow, of London, England, entitled

THE POLICY CF GAS ENRICHMENT (ILLUSTRATED BY LONDON PRACTICE).

[For the text of Mr. Glasgow's paper, see JOURNAL, Nov. 9th, page 723.]

The President, in introducing Mr. A. C. Humphreys as the reader of Mr. Glasgow's paper, regretted very much the physical inability of its author to be present. The latter who had made the trip from England especially to present the communication, was taken ill aboard ship, and his then state was such as to preclude his presence at the sessions.

Discussion.

When the reading of the paper was ended the President urged a full discussion thereof, as a matter of courtesy, and called on Mr. West, of Manchester, England, who, begging off, said, "Americans to the front." Mr. Norris also declined to open the discussion, which was begun by Mr. Henry L. Doherty (N. Y.), who only said that the paper took to task men who were not at hand and "American fairness should guide the discussion." He was on Mr. G.'s side in the matter of low candle power gas, but he could not follow his lead to the end.

Mr. J. A. Norcross (New Haven, Conn.) took exception to the sentence, "It is scarcely necessary to refer to the foolish attempts to *dilute coal gas* by the admixture of blue (or lightly carburetted) water gas," as he considered that it was necessary to refer to them. He expressed the opinion that there is a growing movement (in what direction he does not say) in America and its basis is European. The papers and statements by distinguished men are read here and are relied upon, but he believed any unprejudiced student must take the position assumed by Mr. Glasgow. He considered it well to give a resumé of the enrichment process, the supplying of blue gas with benzol enrichment. He stated that it found origin in a practical way in Germany. They have there, he said, as native a coal which gives poor gas, but little of it, and a poor coke. They had to use English coal, and pay high for it. The duty on oil was up to a short time since 100 per cent. It was recently increased, consequently, as the duty was prohibitive, carburetted water gas was not in the running. Benzol was native, handy, cheap and "naturally there was a temptation to use it for gas enrichment." Another point in the German situation was, he said, "the question of candle power." He declared that it would be a difficult matter to find in Germany a town in which the gas ran above 13½ candles American standard; that, commonly, German gas was between 10 and 11-candle power, which conditions did not obtain in England and much less here; far from it. The speaker then said that when the price of coal went up in England a few years ago the Germans were reduced to severe straits to make any kind of gas. They knew that benzolized blue gas was but a poor makeshift. The National Association, in 1901, had petitioned that the duty be lessened to permit the more general use of carburetted water gas. He said, "Dr. Bunte was one of those who signed that petition, and yet his name is often quoted in support of arguments towards reducing the candle power and dilution by blue gas." The movement spread to England (he said) in large measure by reason of the efforts of Prof. V. B. Lewes who had gone to Germany when blue gas plants were being started for town supply and had returned enthusiastic. He had then written papers on the subject which had not met the criticism which they deserved. Prof. Lewes' paper, at the Gas Congress of the Glasgow Exhibition, in 1900, made a sensation. This told of his plan of introducing blue gas into the hydraulic main or the retorts to hold hydrocarbons which otherwise would go to waste in the retort or main. Later, when he read his paper before the Society of Arts, he claimed a gain of 20 per cent. in heating value by the addition of the blue gas. He also claimed the same gain in illuminating value. Mr. Norcross then made the following pertinent remarks: "I had occasion to study these figures carefully—it seemed marvellous that by simply *admitting* blue gas into a retort a gain of 20 per cent. in heating and lighting power should be made as compared with a like mixture made after manufacture. In the first experiments he (Prof. Lewes) added 29.5 volumes of blue gas, of a net heating power of 73.4 calories per cubic foot, to 70.5 volumes of coal gas of 138.8 calories per cubic foot. Now, by direct arithmetical calculation, the mixture should have

had a heating power of 119 calories per cubic foot. Prof. Lewes twice stated that there was a gain of 20 per cent.; but on turning to the end of the experiment it will be seen that the heating value of the mixture actually observed by Prof. Lewes by calorimeter was 117 calories. There is, therefore, no gain whatever in calorific power, but a loss as compared with mixing." Mr. Norcross considered it more difficult to show the error in the other proposition. He maintained that the claim for increased illuminating value was based on the assumption that the blue gas carried forward benzol and other vapors from the tar; if any had been carried forward a gain in heating power would also have resulted. There was no gain in heating power, but the just shown loss. It followed necessarily that there was no gain in lighting power. In the same paper Prof. Lewes had shown that a change in the method of testing could change the candle power from 14 to 11.5. If the expected candle power were 11.5, this change in method would have given a difference of 22 per cent. The obvious inference was not drawn by Mr. Norcross, perhaps from a supersensitive regard for the rights of the absent.

Mr. Rollin Norris then made note of the value of the reduction in terms of the candle power, as any company could reduce the cost of the product by reducing its illuminating value. He said that if the gain would amount to about ⅛ of a cent per candle power, or if the gas were reduced 5 candles, "an extreme amount," the whole margin would be about 3½ cents, an insignificant reduction if the consumer got the whole of it. He admitted that if a process were forthcoming by which a low power gas could be made costing 25 cents less per 1,000 cubic feet than the present system there would be room for argument in regard to a change. Mr. Norris expressed his view of the case by saying: "But, in general, the higher the candle power of the gas supplied, the more the consumer gets for his money if (even if?) he pay the entire extra cost of the increased candle power."

Mr. Robert Young (Pittsburg, Pa.) then stated the important points usually neglected, that the one thing which can be said in favor of the gas of lower calorific value is the comparative ease with which a perfect combustion may be obtained, and it is this which produced the balance in favor of the lower candle power gas. If the burners are such that perfect combustion comes into play, then the balance is in favor of high candle power gas. The real difficulty is, or so it seemed to Mr. Young, the almost impossibility of getting sufficiently complete combustion or obtain the best results with high power gas. On the other side, the lower the candle power the larger the main. At last analysis it was a case of capital account against running expenses.

Mr. Thos. Littlehales (Syracuse, N. Y.) said he had followed Lewes' work closely, and he underttood, as the results of the experiments at the Crystal Palace works, "That, by putting in 40 per cent. of blue water gas he increased the bulk that much with the loss of 1½ candles." Mr. Littlehales then put the thing into shape as follows: "The claim was, and I think it can be established to some extent, perhaps not wholly, that the blue water gas becomes carburetted in the retort, and in the hydraulic main by taking up benzol and members of various series of light hydrocarbons which otherwise would go into the tar well. In other words, the blue gas which he put in became carburetted by materials usually lost in the well."

The President then called on Mr. John West, of Manchester, England, who said he was very sorry for the absence of Mr. Glasgow, for while a short time ago he had listened to a speech by Mr. Glasgow with which he agreed, this time he had to disagree. Had he had any anticipation of Mr. Glasgow's intention to ridicule the old men at home Mr. West would have provided in someway to call him to account. Mr. West said further that Mr. Glasgow had made a few, but grave slips, some of which could be in a way rectified, and in addition to doing so Mr. West declared his willingness to give his own opinions and to defend them. Denying that he had ever discussed "water gas" from either side, Mr. West declared himself a "low-grader;" not an irreconcilable, but still a partisan. But he considered the question a protean one, depending on the locality and materials to be used. If the use of carburetted water gas could be avoided he should do so, still if he saw anything to gain thereby, use it he should, but only if a distinct advantage from the use could be shown. Making note of the change in the title, and paying a personal compliment to Mr. Glasgow's cleverness, Mr. West added, "He has endeavored, no doubt, from his London standpoint as he calls it, to make out a case." Continuing, Mr. West said that the paper began with methods of enrichment, affirming that enrichment by the use of cannel was played out, "The candle was not worth the game." Mr. West continued, saying that when the illuminating standards were changed the gas men were much pressed to get cannel at a reasonable price, as the cannel owners were not any too reasonable in their ways, and, therefore, the oil processes were welcomed, as by them the works were made practically independent of cannel enrichment. Up to date, having had but little to do with "vapor enrichment," he could not say much. But he had never advised the use, and, taking into consideration the facts he had learned at the meeting, he doubted if he ever should. Mr. West then reviewed the statements made by Sir. Geo. Livesey and by Dr. Frank Clowes, as given in the paper, and continued: "It appears to me that, although he does not say so in so many words, Mr. Glasgow has sought to make you believe and understand that the South Metropolitan Company is sending out gas of less candle power than is required by act of Parliament." He asked, "What are these acts?" because he considered it "assumed here that they should supply 16-candle power gas," and that "According to the statements made by Dr. Clowes the gas was only 14.68-candle power, as shown by his special tests." To appreciate the reasoning of this paper Mr. West said the members must understand the conditions of the London supply. The London gas supply is under the direction of the Metropolitan Board of Works who appoint these three Referees, men of eminence, who stand between the gas companies and the consumers, and these gentlemen arrange for stations for testing the quality of the gas furnished throughout the entire city. The gas is not tested at the gas works, but at the official stations, which are elaborately fitted up, arranged and marked out by the Referees, so that they can test the gas as it is being supplied to the users, and some of these stations are a number of miles from the works. There are testing stations at which the gas from the South Metropolitan Company is tested nearly 4 miles from the gas works. "And I think," he said, "that the assumption is created by this paper, rather that Mr. Glasgow wants you to think and believe that the gas is sent out from the works vaporized before it is sent out, and that it does not reach the consumers at the prescribed 16-candle power standard. Consider the facts in the case. These official examiners (and there is an army of them), test the gas daily in all sections of London, anxious to find it out should the gas be other than the prescribed quality, and if it is they surely report it, as if the gas is below standard the companies are fined, which the companies naturally dislike." * * * These officials report that they have tested the gas supplied by the South Metropolitan Company throughout their entire area, and that they find it to be 16.58 candles, while the test at the gas works for the half year to June 1901 was 16.77 candles. "The official tests made at the official testing places show that the gas gives full ¼ candle more than the Company's act requires." Mr. West then emphasized his position by saying, "What becomes, then, of the assumption and statement introduced here by Mr. Glasgow?" Mr. West then took up these now famous inquiries and figures. He began by saying, "I will tell you what we found out when some of us gave evidence to try to get the candle power reduced. We found that Dr. Clowes and others had been testing the gas in what I should call illegitimate places. They went with this peripatetic photometer to some out-of-the-way district, to the rooms of some School Board and other like places, where the gas had *not been burned for some time*, set up their photometer and got what they called test gas. They went to these places, probably because (in such) they would not expect to find gas of 16 candle power, as the gas had been dormant in the mains for several days. Again, we found that these gentlemen had been testing at the dead ends of mains, and had found low results in such places; yet such are the 'tests' which Mr. Glasgow brings to you for comparison here. The South Metropolitan Company have protested against this sort of testing, and I maintain that the Company have fulfilled every obligation to Parliament and consumers. No gas was ever more severely tested than that of the London companies. They have always come up to the mark and have supplied the consumers with gas of the standard quality. It is also stated on the same page that Parliament, 'Is justified in abolishing a system of enrichments whereby it is admitted that the consumer pays for goods which are not delivered.' The official tests show that the goods are delivered throughout all the districts. Some of the stations are 1, 2, 3 and 4 miles away from the works." Mr. West then took up the question of the gas supplied, thus: "What gas was the South Metropolitan Company supplying? *Not carburetted water gas*, but chiefly, if not wholly, coal gas, and they had to sacrifice their volume for their quality. They obtained only a small quantity per ton of coal in order to keep up their standard. I would like to ask Mr. Humphreys if he knows the calorific value of the gas supplied by the South Metropolitan Company when they were under obligation to give 16 candle power? It would have been well had Dr. Clowes tested the calorific value and placed that beside his special illuminating power gas. The conclusion which I arrive at in this connection is that Mr. Glasgow has been mislead somewhat by Dr. Clowes' statements.

Mr. West said that there were a number of other points with which he did not agree on which he did not wish to begin discussion, as capital expenditure; another was space. On this also he disagreed. It was not unusual to put up a plant making twice the quantity of gas which used to be supplied from the same space. Said he: "I have seen works in this country in which there were only 3 or 4 retorts to the bed. We are putting up 10 retorts on the same (ground) space." Mr. West said the question of coke was also an important one, but in this connection also he failed to agree with the essayist, "Because much depends on the locality, for I know works in which it would pay to burn the coal to get the coke for sale. I am not sure that it would not pay here. I understand that coke has fetched high prices in some districts in America. It depends on locality. In the case of the South Metropolitan Company, which does not use water gas, the sale of the extra coke does not trouble them. A few weeks ago I attended a meeting at their East Greenwich works. They had no coke in the place; they were actually digging up coke roads which they had made and were washing the breeze to sell, such was the demand." Nor could Mr. West agree with the position taken by Mr. Glasgow in regard to machine work, but he did not wish to discuss the matter. As to the products of ordinary gas he only said, "I was not aware until I had read this paper that noxious products were more vicious in ordinary coal gas than in water gas." Mr. West arrayed himself against the flueless gas stove, stating that 50 years ago Mr. Thomas Sharpe advised that no stoves be set without flue connections, and he now urged the same, saying, "I would advise you gentlemen, if the manufacturers are doing this (furnishing flueless stoves) not to fix a stove without proper outlet for the gas generated in it." He also considered "the cost of two candles" as too large a subject to enter on until he had the needed data at hand. Mr. West then took up the basis of Mr. Glasgow's comparisons, including the figures for which that gentleman had made himself responsible, at length saying, "It is stated that 'elaborate determinations have been made by numerous skilled observers of the 16-candle power gas as actually supplied by The Gas Light and Coke Company, compared with the same mixture reduced to a 14-candle power standard tested as prescribed for the 14-candle power gas of the South Metropolitan Company and the Commercial Gas Company. The following results, *verified* by the *author* (Mr. Glasgow) are taken as fairly representative. The 16-candle power district gas and the special 14-candle power gas consisted of two-thirds coal gas and one-third carburetted water gas in each case.' This result was obtained with a 'C' Welsbach burner." Mr. West declared he could not understand the elaborate determinations, and suggested that Mr. Humphreys elucidate them; but, continuing, he said: "Does he mean that he took gas from the supply of The Gas Light and Coke Company's 16-candle power gas, and reduced it by some means to 14-candle power gas, by diluting it in some way, or does he mean that he reduced it by calculation? Either one or other. I do not care which for my argument. Then he takes for comparison this 16-candle power District gas and a special 14-candle power gas, which is two-thirds coal gas and one-third carburetted water gas. *I know of no such mixture* as 14-candle power gas being composed of two-thirds coal gas and one-third carburetted water gas. I never heard of such a mixture before; it is not the mixture made from Newcastle and Durham coal, nor the mixture which Sir Geo. Livesey is making and supplying in London to-day. Then, why make comparisons with the stuff? I do not know why it is made, unless to compare it with some gas which no one has ever heard of on the other side of the water. I confess I know nothing of it; never heard of such a mixture before, and yet all the figures following through this paper are based on this paragraph. If Mr. Glasgow wanted to compare The Gas Light and Coke Company's gas with the South Metropolitan Company's gas, why not test South Metropolitan gas pure and simple? If he had done so he would not have found that special 14-candle power mixture. He would have found a solid coal gas with a higher calorific value in it than he had given to the 14-candle power special mixture. I know the quality of the gas supplied by the South Metropolitan Company; it is not this. No such gas is supplied on the other side of the water (in England), and, therefore, his basis of comparison is *absolutety incorrect*, and, of course, the dependent calculations also." Mr. West complimented Mr. Glasgow on the liberal and scientific way in which he had handled this part of the question, and referred to the "evidence" deduced from Dr. Bunte's inquiry as "mischievous." Mr. West further told of his early experiences with mantles, making the statement that with the mantles he found little difference between Plymouth gas, 15-candle power, and Manchester gas, 20-candle power, but he added, "Mr. Glasgow gives a lot of figures with the price charged by The Gas Light and Coke Company at 75 cents. per 1,000 cubic feet, but he does not tell you that Sir Geo. Livesey is supplying gas at 55 cents per 1000 cubic feet. He then referred to the tests made Dr. McAdam, of Edinburgh, and the recommendation to reduce the candle power. He also praised the methods of Sir Geo. Livesey in instructing his public to improve their fittings as much as they could, and said: "I have no doubt that through this action he is giving better light with his 14-candle power gas than the other Companies are giving without the modern and improved burners." Then, telling of his experiences with the "Can any good come out of Nazareth idea?" he interjected the statement that the calorific value of the "old" South Metropolitan gas (16-candle power) was 645 B.T.U., "higher than that credited by Mr. Glasgow to The Gas Light and Coke Company's 16-candle power mixture;" and also, "There is no doubt whatever that to-day Sir George Livesey is supplying gas having a calorific value of 600 B.T.U." Mr. West then went into the fight for the reduction of the standard, and told some interesting facts, closing his speech with some commonplace advice on handling charges and on some other secondary matters.

Mr. Walton Clark spoke next, holding the brief for Mr. Glasgow against Mr. West's criticism. He was moved to say he "Did not believe it was treason even in England to call attention to the disagreements in statements of Englishmen."

Mr. Alex. C. Humphreys followed, and made a more or less successful attempt to explain and defend. (We should be glad to give seriatim his answers to the criticisms, but that portion of the copy of the minutes is of such character that only a word here and there is legible, and it is better to apologize for omission to our readers than later to Mr. A. C. Humphreys for a misrepresentation, even an unintentional one).[1] At the end of his remarks Mr. Humphreys said a few words which caused Mr. West to reply that he did not know the rules of debate in America. He had had his say, and Mr. Glasgow had had his say. "I do not accept his conclusions, and it would take me another hour to refute what he has said." He also referred to the extra 1,000 cubic feet of gas he got from the coal and said account should be taken of it.

Mr. Humphreys said he could not go into that, and he suggested that Mr. West study the paper carefully and then prepare a reply. That he would assure Mr. West a courteous hearing, we think he said, but again the faint copy of the minutes makes his words doubtful.

Mr. West answered that if his statements could in any way be countered he would make ample apology for any wrong he had done to Mr. Glasgow.

Mr. James Somerville, in a few very well chosen words, reproved the controversial tone which the discussion had taken, which he said was much below that of the paper, and he proposed a vote of thanks and sympathy. The speaker also protested against the miserable word candle power and all its uses, saying: "In reality, we are selliing so many units of energy. We should not forget that; and when people get up with an argument, as had been done there, and say that 500 heat units will do a certain amount of work if burned in a certain burner as well as 650 heat units will do it, he could not follow the argument at all." He then moved a vote of thanks to the author and to the reader of the paper. A member suggested a fraternal telegram to Mr. Glasgow.

The motion was unanimously carried, after which the meeting adjourned, to reconvene the following morning at 9.

(To be Continued.)

[Prepared for the Journal.]

Carbide and Its Uses in Foreign Countries.

By "AN EXILE."

Much of the Apparatus is Defective in Design.—The use of carbide for purposes of making acetylene gas for use in house and street lighting, exhibition purposes in stereopticons, heating, cooking, etc., in foreign countries has developed to a very marked degree during the past three years. The writer has found acetylene gas making devices in the most remote sections of the world. In most instances the apparatus is very defective in pattern and general mechanism. Much of it is constructed on very cheap lines, wherefore the soldering and patching of cylinders and the repairing of jets and connections are frequently necessary. However, the development of acetylene gas burning contrivances in Japan, China, the Philippines, Borneo, Sumatra, Hawaiian Islands and kindred places in this part of the Pacific and connected waters, has surprised the dealers. Your correspondent interviewed representatives of manufacturers of these carbide using devices in various countries and was informed by them that the apparatus could be sold about as fast as supplied. The carbide is now manufactured in such form that it can be readily transported, although the steamship companies carrying passen-

1. Mr Humphreys' remarks, as revised by himself, will appear next week if he so wishes.

gers are not permitted by law to handle it. The reason, of course, is that in the event of the carbide breaking loose from its cans moisture will develop gas at once and explosion and fire may result.

Process of Packing.—Carbide in vast quantities is now exported from America, in cans of sizes ranging from 1 to 100 pounds each, and these cans are packed in boxes and shipped on sailing vessels or on steamers carrying freight only. In Fig. 1 is shown one of the systems used for packing 10-pound cans of the carbide. A common wood case is used, and the can is packed inside with excelsior about it. This system has proven effective for long journeys.

Burners.—Lava tips are used for burners nowadays, because they can be properly shaped and employed with greater freedom than other descriptions. The object is to get the burning jet furnished with sufficient air to effect a combination of rich gas from the supply tank and the atmosphere. The gases from the carbide enter the lower part of the tip through the standpipe, while the air is received through the small holes, *D D*. The gas holes are marked *C C*. In Fig. 3 is presented one of the usual modes of concentrating the flames. Two jets are used piping-shaped in the form shown, with the lava tips reaching one towards the other. The flames of each unite and result in a clear, fan-shaped jet of considerable intensity.

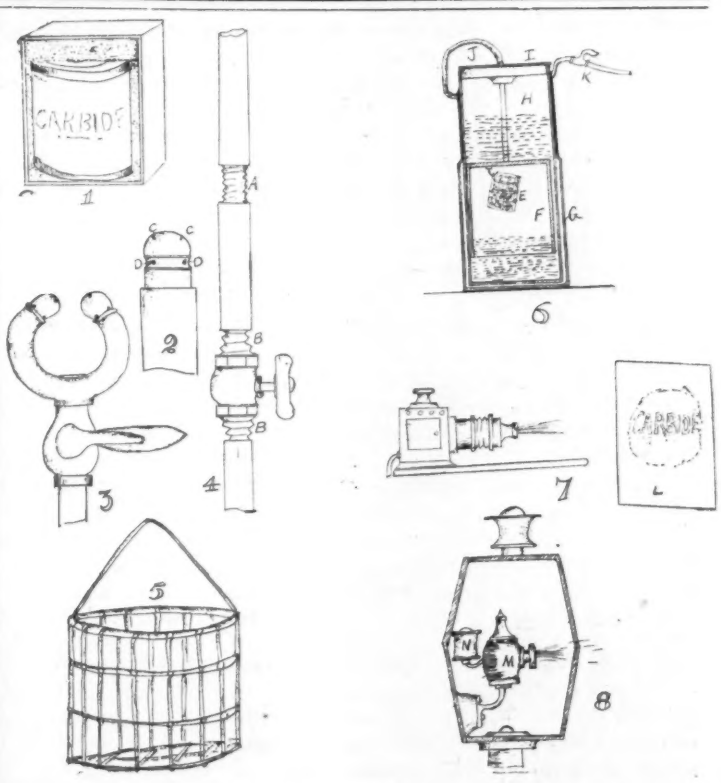
Unions.—In the American markets for these devices for generating and burning carbide the pipe joints are of metallic unions, constructed very similar to pipe joints in engine and steam apparatus design. I observed in the Japanese and kindred outfits that the pipes were chiefly of rubber or linen hose, with screw-shaped thimbles of metal for joining the pieces, as at *A*, Fig. 4. The process of adjusting the piping to the cocks is likewise with spiral screw arrangement, so that the pipe can be screwed on at each side, as at *B B*.

Carbide Basket.—Although much of the apparatus for using carbide gases for lighting, cooking and giving stereopticon exhibitions is made in the United States, all countries visited by the writer manufacture certain designs of their own. The basket for containing the pieces of lump carbide, while the carbide is in process of wetting in the gas generating cylinders, is planned like that in Fig. 5, in the Singapore markets. Singapore merchants make considerable display with carbide lighting devices for show window purposes and for street advertising. They utilize the light back of colored glasses and for throwing views on glass slides on screens. This carbide basket is made of wire. After a few months' use the carbide residue fastens to it and clogs the finer openings. This, however, is overcome if frequent cleaning is kept up.

The General Gas Making Process.—I found in most of the countries mentioned that the principle of producing acetylene gases from the carbide involved the use of a cylinder planned very much like that which is shown in section in Fig. 6. The cylinders are constructed of light sheet metal, as a rule, which is defective, because the carbide has a tendency to weaken soldered joints and the metal is too thin to permit riveting. The result is that very many of the cylinders which I noticed were liberally patched to prevent leakage of the gases at joints. In the cylinder plan in Fig. 6 the basket of carbide is suspended to a hook under the dome of the inner cylinder, *F*, as represented at *E*. Water is admitted into the upper portion of the main cylinder, *H*, and enough of this water settles to the bottom, below the carbide, to form the needed moisture for generating the gas. The gas is cooled by passing out from under the dome through the pipe in the center, which connects with the rubber pipe, *J*, and is carried down and around the lower part of the main cylinder in the cavity, *F*, and thence out through a pipe soldered alongside the exterior of the cylinder and joining the supply pipe to the jets, *K*. The upper flange of the cylinder *I* is removable.

Show Lanterns.—More so than in America the carbide is utilized in foreign lands for purposes of showing pictures on screens. Fig. 7 shows the type of outfit ordinarily employed. It consists of a stereopticon, or a magic lantern and a sheet, with the required views. The gas pipe of the generating cylinder is joined to the feed pipe of the gas jets of the stereopticon and sufficient gas generated to keep the burners freely furnished. The sheet on which the view is thrown is indicated in the cut.

Carbide Extensively Used for General Lighting.—Carbide has been used in America in recent years for purposes of street, house and public building lighting; but the fact that electricity is now available almost everywhere prevents the adoption of this system of lighting on the same scale of importance as in countries of the East and the Islands of the Pacific, where the electrical plant and equipments are not so common. I saw many forms of public lights burning acetylene gas on the plan presented in Fig. 8. Often a common bicycle light is used in large and highly decorated lamp shades. I saw that a number of the street and hall lamps were fitted out on the order of the one shown, consisting of the carbide holder in a nickel case, *M*, with the water tank, *N*, attached



Systems of Burning Acetylene Gas in Foreign Countries. Plans for Generating the Gases from the Carbide.

as shown. Just enough water slowly and gradually drips into the carbide to produce the needed gas for keeping one, two or more lava jet tips burning a steady, white flame. Usually there is an arrangement of reflectors that cause the light to be well distributed.

Explosions.—Even the natives of isolated islands are becoming familiar with the use of carbide. Chinese, Spanish and British merchants at Zamboango, Jolo and other places in the Philippines, also merchants in the Gilbert Islands, Sumatra and like places, use the carbide lights for store lighting, and they handle the chemical for sale to the nativse. Explosions seldom occur, because the people are properly instructed in the use of the carbide and its gases. Lighthouse devices are lighted with acetylene gas in the islands in this part of the world. The carbide finds customers among shippers who use it in search lights. I saw night fishing in progress in the rivers of Mindanao with carbide lanterns. Because the heat can be ended immediately, the carbide gas is used to considerable extent in the tropics for cook stoves.

Rules for the Specification of the Ironwork of Gasholders.—German Standards.

The *Gas World* reports that during the past 5 years joint committees of the German Gas Association and of the Union of German Gasholder Makers have been at work with the view of getting rid, as far as might be found practicable, of unnecessary variations in the specifications of gasholders, and also with the view of settling various points of practice so as to establish a uniformity of custom in the business of supplying gasholders, thus minimizing the chance of disputes arising. The labors of this joint committee have resulted in the promulgation, after mutual deliberation, not unaccompanied by mutual concession, of two documents, one issued to the members of the two Associations two years ago, and the other issued this year, as part of the "Reports of Committees" of the German Gas Association. The former of these is a set of standard rules for the specification of gasholders, but also deals with some points of practice or custom; the latter is a standard contract, but also implies some points pertaining to a specification. We give our readers the substance of these two documents; the former almost in full, the latter only by way of jottings as to the points which are provided for, because of literal translation of the technical language of German law would serve no useful purpose. We have added approximate English equivalents to the linear measurements, so as to indicate more clearly the method which has been followed. The "Notes" to each section are collected in an appendix to the original.

Standard Rules of Specification for the Ironwork of Gasholders, Settled Between the German Gas and Water Association and the Union of German Gasholder Makers, in 1901.

Size.—Sec. 1. The size of the holder shall be stated according to the available geometric volume of the holder in its highest position (neglecting the curvature of the dome, the space within the cups, and a

depth of 0.1 meter at the bottom of the outer lift) according to the following formulæ:

(*a*) For 1-lift holders—

$$J=\frac{D_1^2\pi}{4}(H_1-h_0),$$

(*b*) For 2-lift holders—

$$J=\frac{D_1^2\pi}{4}H_1+\frac{D_2^2\pi}{4}(H_2-T_1-h_0)$$

(*c*) For 3-lift holders—

$$J=\frac{D_1^2\pi}{4}H_1+\frac{D_2^2\pi}{4}(H_2-T_2)+\frac{D_3^2\pi}{4}(H_3-T_3-h_0);$$

where J = the volume of the holder in cubic meters [or cubic feet];
D_1 = the diameter of the inner lift, measured between inner surfaces of the side sheets, in meters [or in feet];
D_2 = the same for the second lift;
D_3 = the same for the third lift;
H_1, H_2, H_3 = the depths of the bells or lifts, measured from the lowest surface of the bottom curb to the upper surface of the cup, or to the angle of the crown curb, in meters [or in feet];
h_0 = 0.1 meter [say, ⅓ foot];
T_1 and T_2 = the depth of the cups, measured from the top edge to the under surface of the bottom, in meters [or in feet];
π = 3.14159.

Notes on Sec. 1.—The German gasholder makers in their draft of 16th March, 1898, said "quantity of gas" where the above says "geometrical volume." They also, later on, made the allowance for overlap (h_0= 0.1 meter = 4 inches, in all cases) vary between 2 inches and 4 inches; the present computation is not geometrically exact, but is brought to uniformity so as to enable different estimates to be compared. The term h_0 is not a datum for crooked suspension of the bell—in good modern holders that would be very slight—but it corresponds rather to the difference of level between the inner and outer tank water when the bell is at its lowest level. If the water exactly reaches the top of the bell, the depth h_0 is practically wanting; that is, it remains unavailable in the content of the bell; and if the whole of the content is to be rendered available the bell must be submerged h_0 below water. This was possible with old patterns of holders, but is not now so. The measurement of h_0 on the outer lift instead of the bell is arbitrary, but is based on this, that so doing tends to compensate an error due to neglect of the quantity of water lifted and dropped by the cups. The phrase "geometrical volume" is correct, because the "quantity of gas" is affected by temperature (sunshine, clouds, etc.), and by pressure (atmospheric pressure, fluctuations due to movements of the lifts) and by absorption and leakage.

Statical Computation.—Sec. 2. (*a*. The statical computation of the guide frame and the framework of the lifts, including the crown, shall be based on a maximum wind pressure of 200 kilogrammes per square meter [41 pounds per square foot] on surface exposed squarely to the wind; the surface exposed being taken as 0.57 times the whole area of the side plates to windward, and the wind pressure as acting horizontally; and also upon a one-sided snow load of 40 kilogrammes per square meter [8.2 pounds per square foot] on the half of the crown to leeward.

(*b*) The thickness of an iron tank shall be reckoned according to the formula—

$$\delta=\frac{DH\gamma}{200qs},$$

where δ = the thickness in centimeters;
D = the internal diameter, in meters;
H = the depth, from the top of the sides of the tank to the bottom of the side sheets, in meters;
γ = the weight of a cubic meter of water in kilogrammes (= 1,000);
q = a co-efficient which gives the relation between the strength of riveted seams and that of plain metal; for double riveting q = 0.75, for single q = 0.6;
s = the permissible tension of the metal employed, in kilogrammes per square centimeter (see Sec. 3).

The thicknesses as calculated by the above formula are to be rounded up to the next full half-millimeter; and beyond that, thicknesses below 10 millimeters are to have an extra half-millimeter added, and no thickness is to be less than 5 millimeters [= 0.2 inch] in gasholder tanks.

[To adopt this formula to British use, it should read $\delta=(62\frac{1}{2}\div 24)\left(\frac{DH}{qs}\right)$ where D and H are measured in feet, s is the maximum permissible tension in the metal in pounds per square inch, and q is the safety factor, a fraction which reduces this maximum permissible tension in the metal to that which can be permitted across the rivets. The English practice for the value of s is, say, 5 tons, or 11,200 pounds per square inch.]

(*c*) The crown curb ring of the bell shall be measured according to the formula $Q=\frac{RD_3(\gamma-\gamma_1)\cos a}{4s}$, where

Q = the cross section of the crown curb ring in square centimeters;
a = the angle which the rim of the crown makes with the horizontal. To facilitate calculations, cos a may be taken as = 1;
R = the radius of curvature of the dome, in meters;
D = the diameter of the crown, in meters;
γ = the weight in kilogrammes of 1 square meter of a horizontal projection of the lifts suspended in their highest position; that is, the floating weight of the iron together with the cup water, divided by the horizontal area of the lower lift.
γ_1 = the weight in kilogrammes of 1 square meter of a horizontal projection of the crown; that is, the weight of the crown sheets and the other ironwork of the crown divided by the horizontal area of the upper lift.
s = the permissible tension in kilogrammes per square centimeter (See Sec. 3).

[For British use, this formula remains unchanged, making Q mean square inches, R and D linear feet ($\gamma-\gamma_1$) pounds per square foot, and s pounds per square inch.]

(*d*) The thicknesses of material set forth in Sec. 4 for the crown, sides and cups are to be taken as correct, and are not to be the subject of calculation.

Notes to Sec. 2.—The static computations for gasholders are so numerous and different in kind that the time is not yet ripe for standardizing them all; and it is not clear that it is even desirable to do so. Data have been given for wind and snow pressure; but there is no precision as to these. Even whether it is right to assume the wind pressure to be equal above and below is not clear, or how far wind pressure may affect larger, as compared with smaller, gasholders. But determinate data for the crown curb ring, the bell and the walls of the iron tank appear useful, if only to prevent false economy; and to determine them by formulæ generally applicable seems best, since these leave scope for variations in the depth and in the gas pressure, which should be first decided upon; and further, these formulæ represent what is now generally admitted in practice.

To make cos a = 1, for simplicity's sake, does not lead far from the truth, for the values of cos a for all the sizes given in the appendix range only between 0.9695 and 0.9536.

The wind pressure acts on the crown curb ring as well as on the whole holder, but it has been left out of view, since it is relatively unimportant, and because the formula agrees well enough with practical experience as it is. Possibly in holders larger than those provided for in the appendix it might be necessary to provide for the effect of wind pressure on the crown curb ring.

The weakening of the section of this ring by rivet holes is also left out of view, because the rivets afford sufficient protection against pressure, and because the angle iron of the ring section can be worked well into contact with one another at the joints, and because the formula, as it stands, corresponds well with the dimensions used in recent practice.

Material.—Sec. 3. In general, ingot iron is to be used, which meets the conditions laid down for ironwork of bridges and lofty erections, settled by the Association of German Architects and Engineers, the Association of German Engineers, and the Association of German Ironmakers (published by Otto Meissner, Hamburg). In Sec. 6, No. 8 of that publication, read "rivets *of more than* 10 *millimeters diameter* are to be hammered in at a bright red heat," instead of "rivets" simply.

The material must be subject, at the outside, to—

Ingot iron, tension or pressure	1,200	kg. per	sq. cm.
" " shearing	900	"	"
Cast iron, pressure	750	"	"
" " tension	250	"	"
" " shearing	200	"	"

Note to Sec. 3.—These particulars are given only for ingot iron, not for wrought iron too, because, according to the German Gasholder Makers' Association, wrought iron is now never used. The tension was fixed at 1,200 instead of 1,000 at the request of the gasholder makers, who said that 1,200 had often been passed, and was not likely to be objected to. The incorporation of the qualities of the iron by reference instead of by quotation is due to the joint committee.

Measurements.—Sec. 4. The measurements given in the appendix are recommended. [See tables in appendix and notes thereto.]

Technical Details.—Sec. 5. (*a*) The gas works is to see to it that sufficient access to the place is provided both for the workpeople going in and out and for the transport of material; that the place is in a suitable condition, and that the contractor can proceed with his work without disturbance.

(*b*) Immediately the gasholder is ready and the scaffolding is removed all is to be made ready for filling with water. With mason work or cement tanks, all unavoidable damage done through putting up the ironwork is to be properly and promptly repaired by the gas works. The gas works has to do the filling of the tank with water, and this ought not to take more than 10 days. During the filling of the tank, the same is to be tested for water tightness and strength. Any defects found are to be put right. A slant of not more than 1 in 1,000 is not to be objected to.

(*c*) If it prove necessary, owing to any fault in the work of the contractor, to empty the tank again, the contractor shall pay the cost occasioned by this, particularly the cost of emptying and refilling; but if the gas works supply any material for this, the bare cost only of such material shall be charged.

(*d*) After filling the tank with water comes the testing of the holder for gas tightness. The gas works is to supply the gas to raise the holder to its full height; and the rivet joints are to be brushed with soap water. Any leakages revealed by this test are to be put right, until it appears that permanent gas tightness has been attained. If the gas works requires any other test for leakages before the holder is filled with gas, it is to provide all needful appliances at its own cost, while the contractor pays for the soaping and putting leakages right. In ascertaining the pressure under which the bell floats the difference between the specific gravities of air and gas is to be kept in view. In observing the height of the bell with closed inlets, it is to be kept in mind that the water of the tank absorbs air as well as gas, until it is saturated at the temperature it has; and that the temperature of the air or gas in the holder mostly varies, and in many cases is affected by sunshine, or even by the passage of clouds.

(*e*) The guide rails must not be more than 5 millimeters out of plumb.

(*f*) The bell must go completely up and down without catching in the guides or going out of plumb more than 1 in 1,000.

(*g*) The guide rollers must turn well and centrically on the running surfaces, and must be on well turned pins.

(*h*) Between the plates to be riveted together, a tape of sacking or webbing, saturated with oil and red lead, is to be laid to tighten the joints; and after the riveting, the edges of this tape, if they protrude, are to be carefully trimmed down with a sharp knife. Screw bolts are to be tightened up by means of hemp fibers wound round them, saturated with oil and red lead. The constructional parts of the crown curb ring are to be fixed flat against one another at their joints, so that the pressure is carried by the entire cross section, and gas tightness secured by the tape.

(*i*) The cups must be water tight, and shall be tested immediately on their being put together by filling them with water. The water is to be supplied by the works.

(*k*) The ironwork is to be all scraped before being sent, and is also to be painted with red lead. After riveting the holder up, the rivet joints and all lutings are to be painted outside and inside with red lead; any further coats of paint to be the subject of special agreement.

Notes to Sec. 5.—(*b*) This is the present usual practice, for the gas works to repair the mason work or cement tank. Apart from that, this work would fall upon the contractor. The period of 10 days for filling is based on experience. There are often difficulties in connection with the water supply.

(*d*) Driving the holder to its full height with gas, instead of air, is the usual practice, and is retained. The makers prefer gas. In some cases—*e. g.*, completely new gasworks—there would be difficulties about this, and testing with air should be arranged for instead. The keeping in view the difference between the specific gravity of gas and that of air in estimating the pressure, and the influence of temperature in measuring the rise of the holder, have been left in general terms, to meet the variations in the numerical data.

(*k*) Red lead has been retained as against varnish or lead and red lead paint, since it is the current practice.

Liabilities.—Sec. 6.—For all damages and faults, arising from defective construction, bad materials or failure in carrying out the contract, the contractor is liable for 1 year after the holder is taken over. For any defect in the appearance of the holder a deduction up to 1 per cent. of the contract price may be made.

Note to Sec. 6.—The period of liability of only 1 year has been retained because a longer period would result in too much security money and in an increase in the cost of the holder, without any corresponding benefit being clearly apparent.

Accounts.—Sec. 7.—The price to be by weight unless otherwise agreed. The sender is, immediately after sending, to notify the weights sent; the gas works is to check the weights and notify any errors within 5 days, otherwise the sender's statement of weights to stand. Overweight up to 3 per cent. to be paid for at standard rates; underweight to be deducted at the same rate. Pieces 5 per cent. under specified weight may be rejected.

Note to Sec. 7.—The period of 5 days is taken as a compromise between 3 days and a week.

Delivery: Penalties for Delay.—Sec. 8. Days to be reckoned from the first day the foreman begins with the work to the day the holder bell is ready to have water run into the tank. Causes of delay which do not lie within the control of the contractor extend the period; and under this head come strikes and the like in the contractor's work, or at the ironworks or collieries which have to do with the supply of material, as also a deficient supply of wagons; but the contractor must give the gas works timely notice of such occurrences. If building work to be done by the gas works be not ready in time, and delay is thereby caused in the contractor beginning his work, the period of completion is correspondingly postponed. For this purpose a delay of 1¼ day in October or March, 1½ day in November or February, or of 2 days in December, is reckoned as 1 day. If the delay exceed 1 month, the contractor can demand a new agreement, so far only as the delay does not arise from causes beyond control, including strikes or shortage of wagons.

If the holder is to be ready before the beginning of winter, the contractor is, in case of delay, to put on more men in order to get the holder ready in time.

If the contractor does not finish within the agreed time, the gas works may withhold ¼ per cent. of the whole sum per week of delay; and damages are limited by agreement to this amount.

Should disputes arise between the gas works and the contractor, it shall remain in the power of the gas works to take over the holder and make use of it, without prejudice.

Note to Sec. 8.—Other arrangements may be found better, according to the importance of the contract and the resources of the parties, the normal arrangement set forth in Sec. 8 provides a standard which may be departed from by agreement of the parties.

Payment and Security.—Sec. 9.—The payment shall be in German legal tender, one-third at the beginning, one-half at completion, and one-sixth 3 months after completion. If there be any delay in payment, interest is to be added at a rate 1 per cent. higher than the current bank discount. On receipt of the first payment, the contractor must deposit 10 per cent. of the value of the delivery either in negotiable papers or in bills of exchange drawn by the contractor and accepted by a bank recognized as of good repute. This security money is to insure fulfilment of the terms of the contract, and will be returned at the expiry of the period of responsibility [*i. e.*, 1 year after completion], unless reasons for postponing repayment have meantime emerged.

10. [The gasworks renounces its right under the German commercial law to rescind the contract in the event of delay on the part of the contractor].

11. [Arbitration clause: costs to be decided by arbitrator].

(To be Continued.)

The Money Value of Technical Training.

[Address of the President—Mr. James M. Dodge—of the American Society of Mechanical Engineers, delivered at the New York meeting, 1903.]

Technical training may be self acquired or obtained through instruction. The ability to drive a nail properly, or to design and construct the most complex and wonderful of structures or devices, is the result of technical training in but different degree. Up to a very recent date, and within the memory of most of us, the apprentice system and that of independent delving represented the sole methods of acquiring training. Research and investigation carried on in individual lines, with varying degrees of success, dependent upon the mental make up of the individual, were the means of attaining theoretical technical knowledge. The blending of these two methods developed the earlier mechanical engineers and will, even in the future, enable those sufficiently gifted by nature and habit to attain eminence. The progress of the

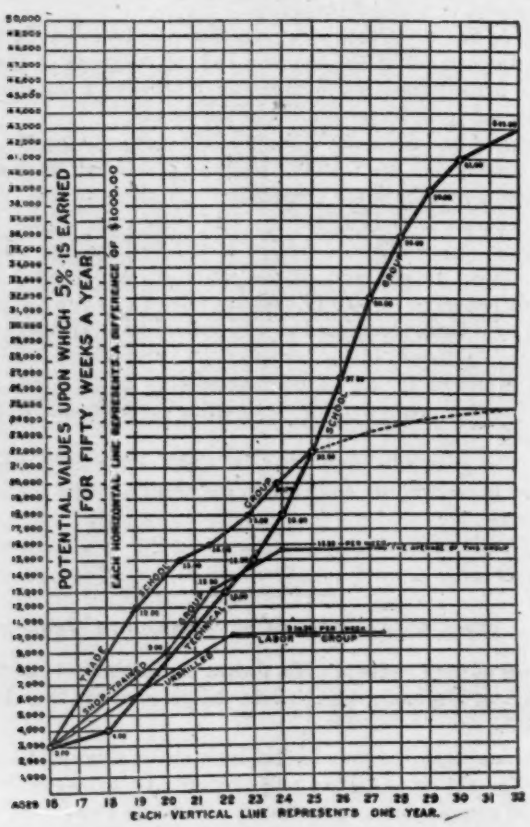
world, however, calls for a better and more speedy means of producing trained men than could ever be developed by the methods of self instruction. The individual striving for manual skill attains his desire under the old apprentice system. Individuals sufficiently gifted arise above their fellows, and become the leaders in their calling. The gratification of a mechanical appetite and the desire to earn more money than his fellows are two moving causes which impel a man toward technical education. A generation or so ago the universal belief was that the sooner a young man entered upon his apprenticeship, or began practical manual work, the better and more rapid would be his progress in the mechanic arts, and book learning was derided as being purely theoretical and of little practical value. This belief is, even at this date, all too prevalent, largely due to inherited error and to lack of knowledge and reliable data.

Obtaining data from which incontrovertible conclusions can be drawn is now comparatively easy, but a few years age was practically impossible. We are all prone to take extreme cases of success or failure as the basis of our opinions, and lose sight of the fact that it is the average man whose career shows the true force and direction of the current. For convenience of comparison I will outline the actual progress made by four groups of men working in the mechanic arts—the unskilled labor group, the shop trained or apprentice group, the trained school group, the technical school group, and give the results attained. Each group I will refer to as an individual.

The Laborer.—The first, the laborer, with but primitive and rudimentary training, working under the immediate and constant supervision of a boss and earning, as the line on the chart indicates, $10.20 per week at the age of 22, his line remaining horizontal through the period of his usefulness. Data are lacking as to his progress before he reaches the age of 22.

The Apprentice.—The second, the apprentice, or representative of the shop trained group, of good health and habits, entering a machine shop at the age of 16 and earning an average wage of $3 per week for 50 weeks per year, which is about the number actually worked, is $150, or 5 per cent. on $3,000. This, then, is his potential or invested value, upon which he draws his interest on pay days.

On the chart accompanying this paper you will find, ruled horizon-


POTENTIAL VALUES UPON WHICH 5% IS EARNED FOR FIFTY WEEKS A YEAR
EACH HORIZONTAL LINE REPRESENTS A DIFFERENCE OF $1000.00
AGES 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
EACH VERTICAL LINE REPRESENTS ONE YEAR.
LABOR GROUP
TECHNICAL SCHOOL GROUP
TRADES' SCHOOL GROUP
SHOP TRAINED GROUP
UNSKILLED LABOR GROUP

tally, lines representing amounts increasing from the lower line upward by $1,000 each; starting at $1,000 and terminating at the top at $50,000, these representing potential values, upon which 5 per cent. is earned for 50 weeks a year. The vertical lines each represent one year in time, beginning at the lower left hand corner at 16, and progressing in regular order until, at the lower right hand corner, we have 32, representing in all a lapse of 16 years. To illustrate the progress of the four groups graphically, we indicate on the line representing 16 years of age, and opposite the figure $3,000, the young man just entering his apprenticeship. We will consider him typical of the shop trained group. Following the line to the right we see his average progress in earning capacity through the ensuing years, noting that at the age of 20 he is earning $9 per week, which is 5 per cent. on $9,000, he having increased his potential or invested value in four years by $6,000. We now note that his accumulated experience enables him to make more rapid progress for the next year and a half, and from the age of 20 to 21½ years we find that his pay has increased to $13.20 per week, and his potential value to $13,200. He is now approaching his goal, and his line of progress does not continue at the same angle that it followed for the past few years, but deflects toward the horizontal; and at the age of 24 we find him earning $15.80 per week, and his potential value $15,800. In other words, in eight years he has increased his potential value $12,800. Observation shows that 5 per cent. of the apprentices acquiring the machinist trade rise above the line made by our average maa; 35 per cent. follow the line closely, and that during the period of training 20 per cent. leave of their own accord, and as near as can be ascertained go to other shops and continue in the line originally selected; 40 per cent., however, are found unworthy or incompetent, and are dismissed, probably never rising to the $15.80 line. Apprenticeship of to-day in many establishments does not make the man, broadly speaking, a mechanic—in a majority of cases he is a specialist or tool hand, and not comparable with the old mechanic, who was a worker in metals, had some practical knowledge of steam and prime movers, could chip, file, work on lathe, planer, drill press or as an assembler, and was competent to meet the varied and unusual conditions found in general construction and repair work.

The Trade School Graduate.—The third group of young men are those fortunate enough to have had the opportunity of entering a trade school, which they do at 16 years of age, devoting the next three years of their lives—or until they are 19 years of age—to acquiring a trade under competent instruction, and at the same time adding to their store of rudimentary theoretical education. At the age of 19 a trades' school man enters the machine shop, and can command $12 per week, equal to the apprentice at 21 years of age, and very quickly makes his employment profitable to his employer. The three years in school have increased his potential value from $3,000 to $12,000, a gain of $9,000. Thus he has caught up with the apprentice entering the shop at 16, and who has been working for five years. Progress of the trades' school group now follows a line which diverges from that of the regular apprentice, and by the time $15.80 is earned by the regular apprentice, the trades' school graduate is earning $20, with a potential value of $20,000, or $4,200 greater than that of the shop trained man. The trades' school line continues at substantially the same angle up to an earning capacity of $22 per week, and a potential value of $22,000. Data are missing as to the further progress, but the presumption is that this line will bear off more toward the horizontal, eventually paralleling the line of the shop trained man, but much higher on the chart.

The Technical Graduate.—The fourth group we will represent again by a boy of 16 studying at school until his eighteenth year, and preparing himself for admission to one of our higher institutions of technical learning, such as the Stevens Institute, the Massachusetts Institute of Technology, Columbia, Cornell and the like, where, after a four years' course, or at the age of 22, he is ready to begin practical work. The statistics upon which this chart is based show the average starting wage at $13 per week, or the same amount earned by the regular apprentice at the age of 21½, and by the trades' school graduate at the age of 19½. In other words, apparently a graduate of our technical schools has lost by his six years of preparatory study, having been beaten by the regular apprentice by six months and by the trades' school graduate by 2½ years. From this time, however, there develops a most interesting and instructive line of progress. The regular aprrentice, who is earning $13.50 a week at the time the technical graduate is earning $13, is overtaken in six months, and we find both earning $14 per week, and the technical graduate reaches the $15.80 line nearly one year before the regular apprentice. In other words, while it has taken the regular apprentice from his twenty-first to his twenty-fourth year, or three years, to increase his wages from $11.50 to $15.80 a week, the technical graduate has done the same in 15 months. Progress now continues on substantially the same line, and we find the technical graduate earning $22 per week and crossing the line of the trades' school group in three years' time, a worthy tribute to the higher education and attainment. The line of the technical graduate now continues divergent from that of the trades' school graduate, with earning capacity regularly increasing, and a corresponding augmentation of potential or invested value, until, at the age of 32, or ten years after entering upon the practical

work, we find our technical graduate earning $43 per week, and his potential value at $43,000. In other words, six years of preparation have enabled him to distance the shop trained man and the trades' school graduate overwhelmingly. Bearing in mind that this is an average line, it is of interest to say that most technical graduates with a better record than the one in the chart have devoted even more time to their preparation, either by study or by shop work, after graduation. Those, on the other hand, who have not come up to this average line represent, in the main, men more or less incapable of original work. The reason that higher education, other things being equal, carries with it the ability to earn high wages is that, consciously or unconsciously, these men are directing and making it possible for large numbers of laborers, shop trained men and trades' school graduates to perform useful work.

A draftsman at his board may never realize that as a result of his drawing 100 men or more may be given employment. His design calling for structural steel, for instance, could not be built were it not for the labor of many men employed making and rolling the steel before it reaches the shop. Then come the shop men, who cut, punch and shear; and then the erectors, who assemble the structure in accordance with the original plan. For this ability and knowledge our technical man is paid.

It is quite obvious that all workers in the mechanic arts cannot be technical graduates. Some must, through natural limitations or lack of opportunity, follow the apprentice line, and others the trade school. It is from graduates of the latter that leading shop men and foremen are largely selected. These two classes, supplemented by the technical graduate, constitute the vast army of workers in the mechanic arts. Thus we see clearly that preparation pays, and that it pays in dollars and cents, and that even a long term of years spent in proper study and technical training is a good investment from every point of view. Of course, apprentices have made and will make, in rare instances, a better showing than the average technical man of the chart, and many of our greatest men have, by sheer force of character, excellence of brain fiber, persistence and self-education, risen to pre-eminent positions, independent of all regular systems. To the end of time great examples of this kind will be found. Among those whose names readily come to mind are the elder Krupp, Joseph Whitworth, George M. Pullman, Andrew Carnegie, John Fritz, Prof. John E. Sweet, Edwin Reynolds, George H. Babcock and Coleman Sellers. The same is true of the trades' school graduate, but, as said before, we are dealing with the average of each class, taken from actual statistics, with an earnest desire to ascertain the facts, and without any preconceived notion of the outcome.

It may be stated as a truism that every man pays for the amount or percentage of bossing he requires, and conversely, every man's wages increase in proportion to his ability to act as the boss or foreman of himself and others. The lower the wage rate the greater the amount of watching and directing constantly required. The slaves of ancient Egypt received no wages, but were treated as horses are to-day. They were fed and sheltered according to the ideas of their owners. No slave worked voluntarily, and the foreman's or leader's excellence was gauged entirely by his physical strength and efficiency as a driver. This was certainly the zero of labor conditions.

The highest wages are paid to the man through whose ability the largest number of other men may be most profitably employed. He does his work with his brain. Thus, on the one hand, we see manual labor receiving no wages, and on the other mental labor reaping the highest reward. Between these two extremes is found every condition of human life.

A practical man performs his work within the radius of his arm, a technical man within the radius of his brain. This fact is, even to-day, realized by the few, but it is gratifying to know that the number is increasing.

The technical training of an individual makes him valuable just in proportion as his ability is manifested by good judgment and perception. Trained common sense receives the highest compensation and reaps the greatest reward. Mental ability to receive ideas and impart them properly and wisely, rearranged and grouped, is typical of the most brilliant mentality; a dull intellect may be compared to blotting paper, fit only to absorb and inter a heterogeneous mass of impressions.

The most interesting of all graphical charts would be that properly exploiting the value of technical training to manufacturing plants and enterprises. To illustrate this more clearly we may fairly assume that the apprentice of our chart corresponds to the old fashioned primitive shop, having practically no overhead expense, the proprietor carrying the business "in his hat," priding himself on his nonreceptive sturdiness, contempt for improvements and personal attention to all details. For his costs he adds together the value of raw materials and labor and then adds a few dollars for profit. The line of this establishment would parallel the $15.80 line of our shop trained group.

The trades' school line on the chart truthfully represents establishments in which some attention has been paid to the improvement of system, with an increased so called non-productive force, operating possibly in some particulars with brilliancy, but with defective features in others; acknowledging the value of improvement if internally originated; moderately but unconsciously absorbent of ideas from without, but tenacious of dogma and lacking departmental symmetry. Growth, increased earnings and relative immunity from disastrous failure result.

The technical graduate line of our chart represents the manufacturing establishment technically trained and "abreast of the times" in all particulars, and I predict a time not very far distant when it will be almost universally recognized that establishments should be trained as well as individuals, and that the marvelous development in scientific shop practice and management will do for the manufacturer fully as much as technical training is doing for the individual.

A change of mental attitude toward the subject of advanced shop practice and management is noticeable to a marked degree. Within a very few years indifference and antagonism have changed to a growing interest and appreciation.

The greatest musical composition contains no new notes; each note of the scale can be sounded on a penny whistle. Our greatest composers have only arranged the notes in harmonious sequence. The artists that can render their music truly, well deserve unstinted praise, even though they lay no claim to the composition of the masterpiece. Truly a listener at the grand opera could say, "There is nothing novel in this; I have heard every one of these notes before. I have even made similar sounds myself, and the result was far from satisfactory." So with shop management; it must be as fundamentally harmonious as a musical composition, and need not of necessity embody within it any one element of extreme originality. Of it the individual may truly say, "Nothing novel has been presented; I tried this feature or that feature with no beneficial result," but if he can play the music of the art of management thoroughly well he need not grieve because he is not its composer.

Henry R. Towne, F. A. Halsey, H. L. Gantt and Charles Day have all ably contributed through our proceedings to the literature of this most important subject. Fred. W. Taylor, in his paper of the current year, while claiming no originality of detail, has presented to the world the most complete and thoroughly scientific system of shop management ever promulgated. As an investigator and student he is sowing seeds in the field of the mechanic arts which will bear a bounteous harvest.

It may be truly said that this society, and others allied in promoting the mechanic arts, complete the system of technical training by going beyond the province of the technical schools, their students being the men who constitute the management of our manufacturing enterprises. It should be gratifying to all of us that the pioneer literature of advanced shop management and practice for this post graduate course of technical training was presented to the world by the American Society of Mechanical Engineers.

The South Wales Anthracite Coal Combine.[1]

Several attempts have been made in the past to unite the South Wales coal trade for the purpose of securing a uniformly fair price, but they have for the most part followed the lines of the Westphalian Coal Syndicate, which allows individuals freedom of action so long as they do not transgress the particular objects for which the combination has been formed. Only about a year ago some prominence was given to the question, and the scheme of Mr. D. A. Thomas, M.P., was revived and discussed at much length, but finally the whole business was dropped, owing apparently to the difficulty of reconciling conflicting interests and toning down extravagant demands; in short, owing to the absence of a Napoleon of finance and organization, who could brush away all obstacles and make the path quite smooth. The scheme which is at present engaging attention in South Wales is far more ambitious, for it provides for the incorporation of virtually the whole of the producers into one huge company. In the abstract, the Welsh anthracite

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coal industry strikes one as readily capable of combination. It is localized; the reputation of the fuel is high; and, what is more to the point, there is no competition worth speaking about. In coal producing circles in South Wales the sentiment seems decidedly favorable; the trouble arises, as usual, from the desire of each individual producer to obtain as much as possible for his property, even (again as usual) to the extent of extortion.

The one great evil of the combination movement of the last few years has arisen from over-capitalization and the willingness of promoters to pay outrageous prices for the businesses acquired, under the impression —though not a few have been tenth rate—that their inclusion was essential to the success of the venture. This is what the South Wales Amalgamation Syndicate appears anxious to avoid. A prominent official stated the other day that over 90 per cent. of the owners expressed their willingness to sell; but they concluded that the syndicate would give fancy prices if only they remain firm. The syndicate, however, takes up the rational, but still novel, view that if amalgamation is to become an eventual success, it must be brought about on such a basis as will provide against over capitalization. "This consideration," said the official referred to, "circumscribed and defined in a very emphatic manner the limit, within which it would be possible for the syndicate to acquire and absorb anthracite properties. Accordingly, each property was investigated and treated for solely with the purpose of ascertaining in the first instance its essential value, and of indicating to each owner, in one figure, and without any bargaining, what the syndicate would be prepared to give for it. To arrive at the value of the mines the syndicate went to very considerable expense and trouble. Engineers, auditors, actuaries, solicitors and other experts went minutely and laboriously into the position and prospects of each colliery, and as the result of their individual and collective labors, the syndicate was able in each case to arrive at a reliable estimate of the natural value of each mine; and making all offers on this basis, giving in each case the extreme outside price it was possible to offer, it has been able on these lines to come to an agreement as to price with a very substantial and important proportion of the mines. The syndicate has, moreover, well grounded hopes of arriving at an agreement on the same basis with an appreciable number of those still being negotiated with. In any event, however, it is declared that the concern is now in a position to go on as a very large and important corporation with the mines it has already definitely acquired. It controls about one-half the properties in the field, these being mainly the mines which yield coal of a high quality.

It is a little more than two years ago since a Welsh coal syndicate was last spoken of and discussed at length. Then we were told of a combine comprehending 60 per cent. of all the producers, and having a capital of £20,000,000. It failed, apparently for the old reasons, chief among them being restrictive covenants in leases and the customary exaggerated ideas on the part of individual owners as to the selling value (to a trust) of their respective properties. But there was still hope that a community of interest would be established; and we were afterwards told that "the idea of the promoters, who are the foremost business men in South Wales, is that all the leading collieries in South Wales should be combined for the purpose of preventing mainly the underselling complained of so much from time to time by middlemen abroad, for insuring a reasonable return on the capital embarked in colliery undertakings, a fair, steady wage for miners—which, it is argued, will lessen the possibilities of strikes—and for arranging that home manufacturers should be supplied with fuel at the lowest price commensurate with the interests of coal owners." The last sentence was intended to convey the impression that the owners will deal in a forbearing spirit with domestic users of their fuel, and would find compensation by putting the screw on the foreign buyer. The latest project goes a little further than the earlier one; but if fair prices could really be assured to the domestic consumer, and the foreigner be made to pay a little more for the privilege of enjoying our coal, we should see little objection to the scheme, for the foreigner will have the coal anyway.

Welsh coal enjoys a peculiar advantage in relation to other varieties of British fuel. Much of the coal shipped from English and Scotch ports is not steam coal and does not enter into competition with the Welsh. There is no good reason, therefore, why Northern producers should make any effort to spoil the syndicate; and, should this body prove successful, gathering strength as it goes, we may be sure that other branches of the coal trade will seek to emulate its example, and form rings of their own. It is in this possibility of development that the danger to the English consumer lies. The form of the Rhenish-Westphalian syndicate is simple enough. It is made up of a group with a small capital, in which every colliery owner takes shares according to his output. Sales are made by the syndicate, and all orders are passed on to it by the individuals to whom they may come, while the colliery receives the amount realized by the sale of its produce, less management expenses. Should the market be over supplied, a proportionate reduction is made all round, with heavy fines for breach of rules; and should it be found necessary to sell at specially low prices in particular markets, compensation is paid out of the general fund to the producers whose coal is used for the purpose. To introduce such a scheme as this into South Wales would mean a revolution in business methods. As Mr. D. A. Thomas, M.P., pointed out in 1896, when bringing forward his own proposal for the prevention of undue competition and for maintaining prices at a remunerative level, it would attack a number of vested interests and make them hostile from the first, and would imply the abandonment of control by the individual coal owner, and the showing of his whole business hand to those who might become his competitors again within a year. And yet this is what must be done if "community of interest" is to prove successful in South Wales; and, as we have said, the combine proposes to exercise a more complete control than the Rhenish-Westphalian Syndicate exercises over German coal.

Some Points that Deter the Spread of Electric Lighting.

Mr. F. H. Davies, writing in the *Electrical Engineer* (London, Eng.) on the topic named in the heading says: The strenuous rivalry between the advocates of electric light and gas has been responsible in the past for many schemes and novel ideas to attract the consumer on the one side and to keep him on the other; and although electrical engineers may fairly congratulate themselves upon having done well, it is still obvious in practically every town that by far the greater part of the lighting is in the hands of gas men, and that a tremendous amount of work has yet to be done by the former before he can even claim equality in output with his rival.

The question arises, "What is left for the electrical engineer to do?" He has cut down his price per unit, in many cases to the lowest margin; he has invented lamps of marvelous efficiency that can compete with the much vaunted Welsbach of the gas engineer; he has put forward free wiring schemes, good, bad and indifferent, to entice the small householder; and yet practically everywhere he is still decidedly in the minority. It is obvious that for the present there is little more to be effected in this direction, and that things had arrived at a pass where it would almost seem to be only possible to contentedly wait for the coming of some great invention that will considerably reduce the cost of generattng electrical energy, or until time and observation have convinced the gas user of the error of his ways.

While it is difficult to point out anything new that the electrical engineer should do to further the interests of his undertaking, it is comparatively easy to find faults and to say what he should not do; and although most of the e faults are small, and to his credit be it said not universal, they undoubtedly do have a bad effect upon his business.

It is an axiom with the successful trader that he must first of all please and make things easy for his customers. If he does this his profit is bound to show up in time. But in electric lighting work generally this axiom does not appear to be at all appreciated. Start at the very beginning, and take the case of a new householder who is wavering between gas and electric light. He goes to the gas company, and is informed plainly that gas is so much a thousand, less, perhaps, a certain simple discount, plus a small meter rent; the service is probably already in, and if he says the word and writes a short note to the effect that he requires a supply, his meter will be fixed and the supply started without any further bother. He now journeys to the electricity works, and we must admit is very probably met with a different reception.

He is informed that the charges are based upon the maximum demand system, or a complicated sliding scale, and perhaps there is also an alternative flat rate offered him. The engineer talks maximum demand for half an hour, leaving the prospective consumer somewhat dazed, and too frequently with the idea, carefully fostered by the gas company, that this is an elaborate system for doing him. He is then told that if he wishes he can take the alternative flat rate, but, although he understands this, the engineer's maximum demand diatribes have left him with a lurking idea that he may on that system get his current a halfpenny a unit cheaper. The result is doubt and perplexity, which frequently drives him to—gas, as being a thing he understands, and one that does not offer two systems of charging and a large element of uncertainty as to their comparative results. But supposing, however,

he perseveres, and despite its intricacies, decides on the maximum demand system, with its problematic halfpenny in the background, or the flat rate with its known quantity, but perhaps higher cost—the next blow he gets is that the meter rent is 2s. or 2s. 6d. per quarter, against possibly 6d. with the gas company. Say he survives this, he is now called upon to fill up a more or less legally worded and formidable application form, in some cases binding himself to pains and penalities that he has not the slightest idea how to avoid. To the educated man the usual application form is not a thing of terror, but it must be remembered that all consumers are not educated men, and that many of the small shopkeeper class—who, by the way, are often excellent consumers—would be deterred from taking the light by the necessity of putting their names to a document beginning with "Whereas" and ending "Dated this——day of——."

It is difficult for an educated man to lower himself to this level of intelligence, but it is no exaggeration to say that cases such as the above do happen, and any engineer who has had personal dealings with prospective consumers in a provincial town must have met with them. Obviously this is not the way to secure every bit of custom that is to be had. The function of an electricity undertaking is to sell current, and to do this thoroughly it is necessary, especially in the provinces, to start with the assumption that the public is generally not endowed with either brains or time to solve intricate electrical or economic problems, and does not wish for a sword of Damocles over its head in the shape of a wordy agreement adorned with a sixpenny stamp reposing in the coffers of the supply authority. It may be truly argued that without such an agreement risks out of proportion with those of the gas company are incurred; but risks have to be run at times, and years of experience in gas supply do not afford any great instance of disaster in this direction.

Decidedly some sort of application and agreement form is necessary, owing to the great expense of service laying, but beyond the necessary data of the installation it should be as concise as possible, and so worded as to be within the comprehension of the meanest intellect, instead of, as is too frequently the case, a field for some legal light to display his knowledge of the law's technicalities. It pays a gas company, on the whole, to put in a service for a couple of lights, and they do not penalize a consumer with a minimum charge for shutting up his house for a quarter. In a like manner it must pay an electric lighting concern, although, perhaps, in a lesser degree. What we have to look at is the moral effect of this sort of thing, not the present monetary return. A progressive policy that neglects minimum charges and such like petty annoyances is one that pushes the lights into all sorts of unexpected quarters, thus advertising it and loading up mains that do not bring in a satisfactory return on their capital outlay.

Chaos is surely exemplified by the various systems of charging now in use. It is not the desire of the writer to awake the wrath of the maximum demand, sliding scale or flat rate advocates, besides which any attempt at discussing the various merits of these systems is perfectly useless and beside the mark. But is there any excuse for the extraordinary combinations that a glance down the columns of a central station list will reveal? One town favors the flat rate, another the maximum demand, and so on. That is all very right and simple, merely a difference of opinion, but how is it possible to combine the two, offering one as an alternative to the other. Maximum demand literature strives to convince the reader that the only possible system is the maximum demand, and in like manner flat rate advocates strenuously uphold their opinions. What, then, are the ideas of the engineer or corporate bodies using both systems? On the face of it, it appears that they cannot thoroughly believe in either. The concurrent use of the maximum demand system does not hurt the flat rate, but the latter is surely, both theoretically and practically, fatal to the results sought after by the use of the former. This sort of thing is not reassuring to the consumer; he is apt to think that he is being done on the system he uses, and in the average case, where the results of the two systems are fairly equal, there is a very general tendency to chop and change about, on the strength of the old adage, "there is always better grass on the other side of the fence." This feeling of indecision is liable to have bad results where the gas company's tariff is simple and straightforward, and, it must be borne in mind, places a very powerful tool in the adversary's sometimes not too unscrupulous hands.

The cost and inconvenience of wiring is perhaps one of the greatest deterrents to the popularity of electric light. Free wiring very successfully combats the former point where a good system is in vogue, and seems about the only answer to the problem. There can be no doubt that in most cases wiring prices are cut to the very smallest limit of profit, which is unfortunately only too frequently a source of bad work and consequently moral harm to the light. On any of the present systems we cannot hope to compete with the gasfitter in price, but there is one thing that we can and should do, and that is try and conduct wiring operations with a little more regard to the comfort of the householder and the well being of his property. There are, of course, many good firms and individual wiremen who make this point a special feature, but there are also very many who do not, with the result that one of the commonest objections to installing electric light is the havoc made by wiremen.

Who has not seen cases of molten solder dropped on carpets, furniture ruined by being used as scaffolding, and unsightly holes left in walls and ceilings, because, forsooth, "it is a plasterer's job to repair them." Now, the wireman is by trade essentially a handy man; he is able to leave the house in as good order as when he entered it, and when he is a sensible man, and not overburdened with absurd socialistic and trades union doctrines, he recognizes that the more satisfaction he gives to his employers, the better in the long run for himself and trade in general. But there is a class, recruited usually from the sweepings of other trades—and, by the way, not at all loved by the genuine wireman—the presence of whose members on a job is harmful in the extreme to the prestige of electricity generally and wiring firms in particular.

Cheapness cannot be put forward as an excuse for employing this type of man. Generally he is the one that is most insistent upon being paid the full union rates for skilled work. Respectable wiremen who have an appreciation of *meum* and *teum* are to be had in hundreds; why, then, do those men find employment who are not only often bad workmen, but perfectly unscrupulous? It is obvious that the wiring contractor should be most particular about the men he employs. As a body he has a bad name; that is indisputable, and the chief cause for this lies in some of the men who work for him. If the contractor is more careful in his selection, the results will be better work at possibly less cost, greater satisfaction to his customers, and increased trade. In the present state of affairs a firm with a reputation for employing civil, clean and careful men has a future in front of it far beyond the gloomy expectations that are usually entertained of the outlook of the wiring trade.

Returning to the central station engineer's side of the engineer's question, there are one or two points in general management that have an important bearing on success. Canvassing obviously suggests itself first as a means for obtaining consumers, and the usual proceeding appears to be to obtain a *soi disant* canvasser, pitch him out into the street of a town he knows nothing of, for so many hours a day, and trust to the man himself and a good dose of luck for results. This is usual, but far too casual.

A petty annoyance that is often complained of is the too frequent calling of inspectors, sometimes at inconvenient hours. The men themselves are generally to blame for this; calling on consumers with the vague excuse of having to look at the meter, while scarcely profitable to the inspector'r employers, is a very congenial way of spending an odd hour or two, affording him as it does the company of the female denizens of the lower regions and a possible glass of beer. This is only one of the many small points that have a bearing upon general results, but such details, insignificant as they may seem, all add up, and we have reached that stage in competition where even the smallest point must not be despised.

American Central Electric Station Statistics.

Mr. W. M. Steuart, Chief Statistician of the United States Census Office, has just issued a most interesting and important preliminary bulletin devoted to electric light and power stations for the year ending June 30, 1902. A few figures relating to the report were issued a month or two ago and this bulletin will be followed up by a more elaborate and complete report. As it is the present document embraces no fewer than 50 tables, which, with the running discussion on them, constitute the first thorough treatment of the kind that this great industry has yet received; and laying the foundation for all such statistical work in the future. We shall have occasion to return to this subject, and to present many of these tables and accompanying remarks to our readers. For the moment it must suffice to note that at the time of the enumeration there were 3,620 central electric stations in operation. The cost of their construction and equipment amounted to $504,740,352. The gross income for the year was reported at $85,700,605, and the total expenses at $68,081,375. These stations furnished employment to 23,330 wage earners, who received $14,983,112 as wages during the year. The power plant equipment consisted of 5,930 steam engines with 1,379,941

indicated horse power, and 1,390 water wheels with a stated horse power of 438,472. The generating plants consisted of 12,484 dynamos of every description with a stated horse power of 1,624,980. A noteworthy feature of the development of this industry has been the installation of plants operated under the control of municipalities. There were 815 of these plants in operation. The cost of their construction and equipment was reported at $22,020,473. They gave employment to 2,467 wage earners and paid $1,422,341 in wages. These figures do not, however, tell the full central station story, as during the same year there were 252 electric railways doing a central station business as previously noted in these pages; nor, of course, are any data presented from the 50,000 isolated plants—more or less—that exist all over the country. The current output for the year is estimated and returned at 2,453,502,652 kw.-hours, or about 25 per cent. of the possible work that the stations could do in 24 hours of daily operation.

The general introduction of electric lighting is shown by the fact that of the 1,892 places reported at the Twelfth Census as having a population of 2,500 and over, 1,511 had one or more central electric stations operated either independently or in connection with an electric railway, and there were 1,960 places with a smaller population having similar stations. In addition, there were a number of large central electric stations which furnished current to surrounding cities, towns and villages, so that an enumeration of the places in which central stations were located by no means represents the distribution of the current. Moreover, the term "central electric station," as used in this report, includes a number of plants, but in cases where two or more plants were operated by the same individual, firm or corporation, and located in the same State, a separate report was secured for each whenever the system of accounts permitted the preparation of separate returns; otherwise, one report was obtained to cover the operations of all plants. For instance, the Edison Electric Company, of Los Angeles, Cal., generates current in 3 mountain water power plants and 4 steam plants in different localities all connected by transmission lines. These 7 plants were included in one report and were counted as one station. There were 1,463 central electric stations operated by private companies or municipalities in connection with the manufacture of gas, the operation of water works, or other industries. It is very interesting to note that there were only 827 cities and towns in which one or more gas plants were in operation. The fact that 75 per cent. of the central electric stations are in places of less than 5,000 inhabitants, as compared with 22.8 per cent. of the gas plants, indicates the wider distribution of the electric stations which have enabled the inhabitants of the small places to enjoy illuminating facilities.

More than 150 private and municipal stations have commenced operations during each year since 1888, and in each of 9 years since that date more than 200 have been installed, the greatest number, 277, being reported for the year 1898. Each State and territory contains a number of central electric stations operated under private ownership, and all, with the exception of 3 territories, and the District of Columbia, Nevada and Wyoming, report one or more municipal stations. Illinois contains the greatest number of stations operated under private ownership and Ohio the greatest number under municipal control. The greatest proportion of central electric stations is found in the North Central States. In 1890 these States contained 43.1 per cent. of all the electric stations in the United States, and in 1902 the proportion had increased to 47.1 per cent. The greatest percentage of increase in the number of stations is shown for the South Central States, where 79 stations had been installed up to 1890. This number increased to 404 in 1902, or 411.4 per cent. Of the total number of stations reported, 2,805, or 77.5 per cent., were operated under private or corporate ownership and 815, or 22.5 per cent., under municipal control. There were 13 stations operated under private ownership in 1902 that were formerly under municipal control. Of the 815 municipal stations, 77 commenced operation under individual or partnership control and 93 under corporate ownership. A further division of stations operated under private ownership is made in Table 34, from which it appears that 964 stations, or 34.4 per cent., were installed by individuals or firms, and 1,828, or 65.2 per cent., by corporations. At the time of the enumeration in 1902, the number of stations operated by individuals or private firms had been reduced to 756, or 27 per cent., while the number controlled by corporations had increased to 2,049, or 73 per cent.

THE Gas Machinery Company, of Cleveland, O., has agreed to construct, for the Niagara Light, Heat and Power Company, of Tonawanda, N. Y., a modern coal gas works up to a daily capacity of 250,000 cubic feet.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

"O. R. M.," WRITING from Chicago under date of the 2d inst., says: To the Editors AMERICAN GAS LIGHT JOURNAL: I wish Mr. Alten S. Miller, ex-President of the American Gas Light Association, could make it convenient to visit the 'Windy City.' I am inclined he then might change his opinion about gas arc lamps. About 40,000 of such lamps are here in operation. The Peoples Gas Light and Coke Company has at present (and for some time back) 17 wagons out, each wagon carrying 2 men, whose duties are to look out for and install lamps of the sort upon whose virtue his faith puts not much dependence."

MR. R. W. POAT, or Post, or Port, whose mailing place is Buffalo, N. Y., and who has sent to many Mayors of many cities a proposition—the proposition is of the typewritten sort—to furnish the citizens of such cities with a high candle power gas at a cost of 35 cents per 1,000 cubic feet, has not as yet met with much encouragement. If he continues to try hard, he might finally induce the Consumers Gas Trust, of Indianapolis, Ind., to give him and his process a trial; failing which, Hamilton, O., would seem to afford him an opportunity. The trouble with Mr. "P.," is that his promises are beyond his powers.

THE main offices of the Willow Grove (Pa.) Gas Light Company, incorporation papers respecting which were filed last November with the Pennsylvania State authorities, are in the Commonwealth Building, Nos. 1406 and 1407, Philadelphia, Pa.

THE Missouri Water, Light and Traction Company has sold all of its plants and properties in Nevada, Mo., to the Union Water, Light and Traction Company, with headquarters, at Jerseyville, Ills.

MR. DAVID LEAVITT HOUGH is not single now. His life's associate was Miss Heloise Beekman, and the contract was formally agreed to conventionally some days ago, in the church of Zion and St. Timothy, this city. Good luck to them.

WE regret to be called on to report the death of Mr. Hugh Murphy, who for many years superintended the works' division of the old Sing Sing (N. Y.) Gas Company. Mr. Murphy died at his home in Yonkers, N. Y., the morning of the 28th ult., and interment was subsequently made in the family plot, St. Augustine's Cemetery, Sing Sing. He was in his 61st year.

THE Board of Gas and Electric Light Commissioners of Massachusetts has approved the petition of the Lawrence Gas Company for the right to increase its capital and bonds in the sums heretofore named in the JOURNAL.

HERE is an inquiry from Philadelphia, dated the 7th inst.: To the Editors AMERICAN GAS LIGHT JOURNAL: Can anyone advise me through the office of the JOURNAL where a sample of glass pipe for street main, that was at one time proposed, can be obtained or seen, or furnish the names of the people or firm identified with such proposed pipe, with whom communication may be made. Address, "Inquirer."

MR. ELISHA B. GADDIS, a Director in the Essex and Hudson Gas Company, of Newark, N. J., died at his home, Broad street, that city, the night of November 27th. The funeral services was held at his late residence, the afternoon of November 30th, the Reverend Doctor David R. Frazier, pastor of the First Presbyterian Church, officiating.

WRITE to Messrs. Henry Maurer & Son, of this city, for a copy of their brochure entitled, "A New Form of Wall Construction, Especially Adapted to Factories, Shops and Piers."

MESSRS. M. C. WHITFORD, James P. Gage and G. Peterson, have applied for letters incorporating the Milton and Milton Junction (Wis.) Gas Company. The concern is capitalized in $20,000.

THE West Allis (Wis.) Gas Company has been incorporated by Messrs. Oscar Kroessing, Fred. Glahn and F. W. Dockery. It is capitalized in $50,000. The likely principal is the Milwaukee Gas Light Company.

AT the annual meeting of the Peoples Power Company, of Moline, Ills., the officers elected were: Directors, C. O. Nason, C. H. Deare, W.

L. Velie, S. S. Davis, Philip Mitchell, T. B. Davis and A. W. Vanderveer; President, C. O. Nason; Vice-President, Philip Mitchell; Secretary and Manager, S. S. Davis; Treasurer, W. L. Velie.

THE Directors of the Equitable Illuminating Gas Light Company, of Philadelphia, Pa., have declared a semi-annual dividend of 3 per cent., payable on and after the 15th inst.

MESSRS. GEORGE T. ABREY and Fred. A. Hunt, of Detroit, Mich., have applied to the Council of Corunna, Mich., for the right to there construct and operate a gas plant.

THE Waynesboro (Pa.) Gas Company has declared a dividend of 5 per cent., payable the 1st prox.

MR. JAMES GIBBONS has resigned the Superintendency of the Penn Yan (N. Y.) Gas Light Company to accept a responsible position in the service of the Gould Manufacturing Company, Seneca Falls, N. Y.

MR. JAMES B. MCGOWAN has been elected President of the Kansas City (Kan.) Gas Company.

MR. LEE F. CURTIS has been appointed Superintendent of the gas division of the properties of the Eastern Wisconsin Railway and Light Company, of Fond du Lac, Wis.

AT a meeting of the Directors of the Hartford City (Conn.) Gas Light Company, which meeting was partially held to consider matters connected with the proposed change in ownership of that Company, the following resolutions were adopted:

"*Whereas*, A proposal to stockholders of this Company has been made by Messrs. Bertron & Storrs, bankers, of New York city, for exchange of shares of this Company for shares of a corporation to be formed under the laws of the State of Connecticut and located at Hartford, to hold the stock of this Company (with the privilege to stockholders not desiring to so exchange to sell their shares for cash); and

"*Whereas*, The condition of said proposal is that the indebtedness of this Company, less its accounts and bills receivable, does not exceed $600,000; and

"*Whereas*, A large number of the stockholders of this Company, it is understood, have accepted said proposal,

"*Voted*, That in order to speedily eliminate the condition of said proposal the privilege and opportunity be immediately given by the Treasurer and Secretary, to Messrs. Bertron & Storrs to examine, by competent auditor named by them, the books and accounts of this Company, for the purpose of verifying the fact that its indebtedness, less its accounts and bills receivable, does not exceed said sum of $600,000.

"*Voted*, That in order to facilitate notice to stockholders of this proposal the Secretary of this Company be and he hereby is instructed to furnish at an early date to Mr. Atwood Collins, Chairman of the Committee already named by the stockholders, who have already accepted said proposal, a full and complete list of the registered stockholders of this Company, showi ng names, address and number of shares standing in their several names on the books of this Company, as of this date, December 5, 1903.

"*Voted*, That while this Board has full assurance that the indebtedness of this Company, less its accounts and bills receivable, does not exceed the sum of $600,000, pending verification of said fact defers formal recommendation of said proposal of Messrs. Bertron & Storrs to the stockholders of this Company."

MESSRS. H. M. WALLACE, Oscar F. Burkhart and Frank W. Lyle are attempting to convince the Council of Ludington, Mich., that a gas works should be constructed there, and that the applicants are the ones who should be permitted to install it. The applicants agree that the charge for a gas supply on illuminating account shall not exceed $1.50 per 1,000 cubic feet, the charge for gas use on fuel and power account to be $1.25.

THE Town Council of Kimberley, South Africa, has granted a franchise for the supply of gas there to the proprietors of the Cape Town Gas Company.

A CORRESPONDENT in Davenport, Ia., forwards the following: "The Supreme Court of the State of Iowa has handed down a decision in the case of the Davenport Gas and Electric Company *vs.* J. N. Reimers et al, appellants, in which the decision of the lower Court is affirmed. The importance of the case is that it holds that a person letting his name be used in a firm is responsible for the debts, although he has no interest in the business. A firm by the name of the J. N. Reimers Printing Company had been using power and light from the Davenport Company and the bill was sued upon. J. N. Reimers was made a party, but contended that he had no interest and was not liable. The judge held that as his name was used in the firm he was liable, though he had no interest. The case was appealed and the decision affirmed."

MR. ROBERT T. KING, Secretary Board of Public Works, Kansas City, Mo., is responsible for the publication of the following notice to contractors, which has to do with the furnishing of a 48-inch submerged pipe line—the details as appended are clear enough:

"Sealed proposals will be received at the office of the Board of Public Works, at City Hall, Kansas City, Mo., until 12 o'clock noon, Thursday, December 31, 1903, for furnishing all material, tools and labor necessary for constructing and submerging a 48-inch diameter by $\frac{9}{16}$-inch thickness, steel riveted pipe line across and under the Kaw river, for Kansas City Water Department. The work consists of approximately 600 lineal feet, to be laid to a profile approximating 6 feet below river bed. Work to be done in accordance with plans and specifications furnished by the Superintendent of the Water Department.

"All bids must be made on blank forms furnished by the city, and marked 'Proposals for Submerged Pipe Line,' and addressed to Secretary of the Board of Public Works, Kansas City, Mo.

"At the time of filing of each bid, each bidder whose bid exceeds $2,000 shall deposit with the City Comptroller the sum of $200, to be forfeited and retained by Kansas City, and paid into the City Treasury by the City Comptroller, as liquidated damages, in case the bidder shall fail to enter into a written contract to do the work bid for according to the terms of his bid, within 10 days after the acceptance of such bid.

"Should the law-making authorities of the city, by ordinance, and prior to the deposit of said bid, increase the amount of cash deposit required, then the bidder will be required to make the deposit so fixed by ordinance, and in that event the said deposit shall be held as liquidated damages as aforesaid.

"A surety bond of 75 per cent. of the amount of bid will be required when contract is made.

"Bid blanks, profiles, plans and specifications, soundings and borings will be furnished on application to Superintendent of Water Department.

"Bidders will be required to show their ability to construct said line, and that they are in every way qualified by experience and equipment to perform the work.

"The Board reserves the right to reject any or all bids, or to reject any bid, if said Board deems it is to be for the interest of the city so to do."

A CORRESPONDENT in Christchurch, New Zealand, writing under date of November 2d, says: "The Directors of the Christchurch Gas Company recently engaged a high-class engineer in England, Mr. Robert English, F.C.S., and that gentleman will arrive by the Kumara, now shortly due. For over 2 years Mr. English acted as Chief Assistant at the Crystal Palace District Company's works, succeeding Mr. G. P. Lewis, now of Aldershot, and for over 2 years prior to that he occupied the position of chief chemist at these works, and in that capacity superintended all the experiments made to test the value of Professor Lewes' method of passing water gas through coal gas retorts. Mr. English went to the Crystal Palace District Gas Company from Beckton, where he was employed for about 7 years. He holds first-class honors from the City and Guilds of London Institute, and also took first-class in the Polytechnic examinations in gas manufacture. For 2 years he was responsible for most of the abstracts of technical papers published in the 'Transactions of the Institution of Gas Engineers,' and he has made a special study of purification and of the manufacture of carburetted water gas. Mr. English is a Fellow of the Chemical Society. Mr. A. S. Neil, who has been Works' Manager for some years, will still continue to fill that position."

A SPECIAL meeting of the shareholders in the Brooklyn (N. Y.) Union Gas Company, to increase its capital indebtedness in the sum of $5,000,000 will be held the 30th inst.

IT seems that it has not been definitely decided that Mr. Henry B. Wales will resign his position as Secretary-Treasurer of the Grand Rapids (Mich.) Gas Light Company to assume the management of the affairs of the Vincennes (Ind.) Gas and Electric Company.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

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ELBERT P. CALLENDER,
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MANAGER.

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, DECEMBER 14, 1903.

The Market for Gas Securities.

Returning reason seems to prevail at the moment amongst those who deal in "industrials." Even though you may sell iron and steel, it does not follow that all "industrials" are as easy of transference from pockets to the public. While certain "industrials" were being marketed others were being marked down, irrespective of worth, with the result that some shares, as staple as wheat or as real as cotton, were sacrificed by the needy and secured by the rich. Anyone who will class gas shares of approved worth with manufacturing stuffs of uncertain worth are tyros in the art of investing, and so should bear their burden, but real value tells in the long run, especially so where one has not to go far from home to look over the ground. Apart from philosophy, however, the fact is that Consolidated gas is in good demand just now, the closing to-day (Friday) being reported at 182½ to 184. There is no reason now, under the political conditions which will exist and be in force after January 1st, that the Consolidated Company may complete its "grab" (Heaven save the mark!) of putting under ground, through marsh and slime, a few miles of pipe. City gas bonds are in positive demand.

Brooklyn Union crossed 200 during the week. The meeting of the shareholders to increase the "indebtedness" of the Company in 33⅓ per cent., will be held the 30th inst. The bid price to-day was 203; asked, 209. Our prediction of some weeks ago as to where it should be by January 1st., still holds good. Peoples, of Chicago, is virtually at par. It should be at least par and 10. Baltimore Consolidated, notwithstanding the skim milk proposition of the denizens of the Canton district, holds its own and more. The general situation favors purchasers, and we have no hesitation in saying that United Gas and Improvement Company would be a good thing to buy. All reputable firms of brokers in Philadelphia deal in it. The Company has declared its regular quarterly dividend of 2 per cent., payable the 15th prox.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

DECEMBER 14.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	182½	184
Central Union, Bonds, 5's.	3,000,000	1,000	104	106
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan	658,000	..	108	112
Mutual	3,500,000	100	260	300
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co.				
Bonds, 5's	11,000,000	1,000	103	105
Northern Union, Bonds, 5's.	1,250,000	1,000	105	106½
New York and East River				
Bonds 1st 5's	3,500,000	1,000	102	106
" 1st Con. 5's	1,500,000	..	109	111
Standard	5,000,000	100	135	140
Preferred	5,000,000	100	155	170
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299,650	500	180	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	203	209
" " Bonds (5's)	15 000,000	1,000	119	119½
Bay State	50,000,000	50	⅛	¼
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	7	7½
" " Bonds, 5's	5,254,000	1,000	73	76
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co.	29,500,000	100	96½	97
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	101	101½
Columbus (O.) Gas Lt. & Heating Co	1,682,780	100	88¼	89¼
Preferred	3,026,500	100	107½	109
Consumers, Jersey City Bonds	600,000	1,000	100	102
Consumers, Toronto	1,700,000	50	218	225
Consolidated, Baltimore	11,000,000	100	60½	62
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	86	90
Consolidated G. & E. Co.'s. Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	87	95
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	382,000	1,000	65	75
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	85	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	50	65
" Bonds, 6's	2,650,000	..	103½	106½
Jackson Gas Co	250,000	50	73	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	79	90
Preferred	2,500,000	100	90	..
Bonds	10,000,000	1,000	109½	110
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	136	140
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	107½	108½
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	184¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	58	58
Bonds, 6's	4,600,000	..	105	105¾
New Haven	1,000,000	25	250	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	98⅞	99
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	15 800,000	100	67	67¼
St. Joseph Gas Co.				
" 1st Mtg. 5's	751,000	1,000	92	96½
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	92	93
Syracuse, N. Y.	1,975,000	100	46	48
Bonds	2,047,000	1,000	94	96
Washington, D. C	2,600,000	20	280	287½
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del	600,000	50	232	..

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(Continued on page 936.)

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., Dec. 9, 1903.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Jan. 15th, 1904, to stockholders of record at the close of business, Dec. 31, 1903. Checks will be mailed.

1488-5 LEWIS LILLIE, Treasurer.

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As Manager or Superintendent of a Water Gas Plant,

By a man 44 years old. Has made good showing in developing new business. Is at present with plant putting out 350,000,000 yearly. Address, "A. B.,"
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Position Wanted.

Young man, experienced in gas business, desires position as manager of a gas company in a town of 8,000 to 12,000 inhabitants. Best of references.
1488-1 Address, "H. R. H.," care this Journal.

WANTED,

By a First-Class, Practical Man,

Of 16 years' experience in the manufacture, purification and distribution of gas, a position as superintendent of a small works, with an output of 50,000,000 to 75,000,000 cubic feet per annum. Lowe process preferred.
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POSITION WANTED.

As Superintendent of a Small Gas Plant, or as Assistant Superintendent or Foreman of a Large Plant.

Have had 15 years' experience in water gas apparatus. Am at present Superintendent of the El Dorado Gas Co., of El Dorado, Kas. Has reason for change. Can give best of references. Sober and industrious. Address, E. T. BUTLER,
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STUART WOOD, TREAS.
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Macon, Ga., Nov., 3, 1903.

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By O. M. Diall

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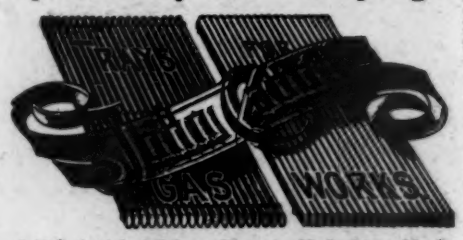

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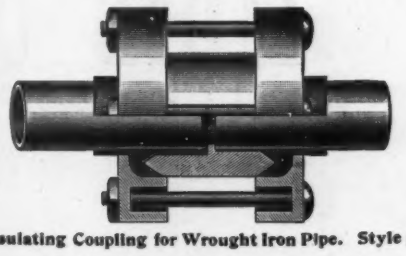
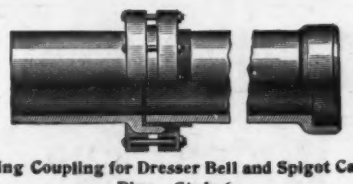
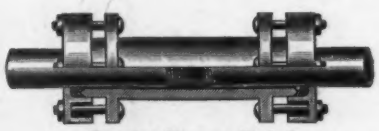


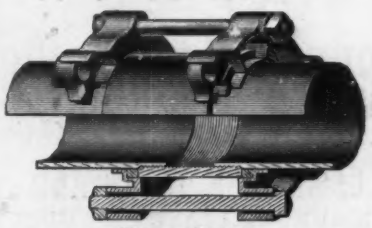
Insulating Coupling for Wrought Iron Pipe. Style 5.



Insulating Coupling for Dresser Bell and Spigot Cast Iron Pipe. Style 6.



Regular Sleeve. Style 2.



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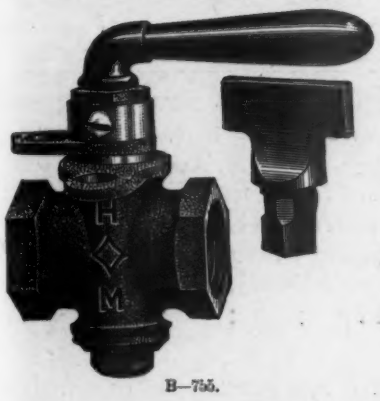

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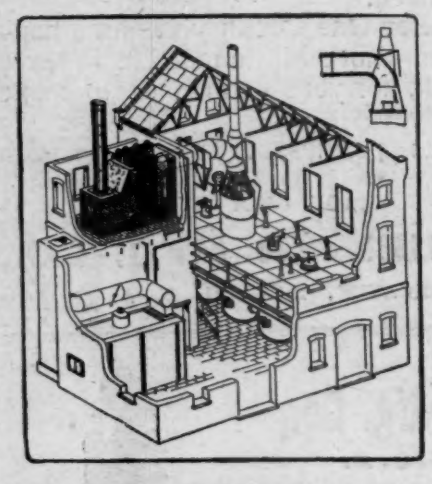

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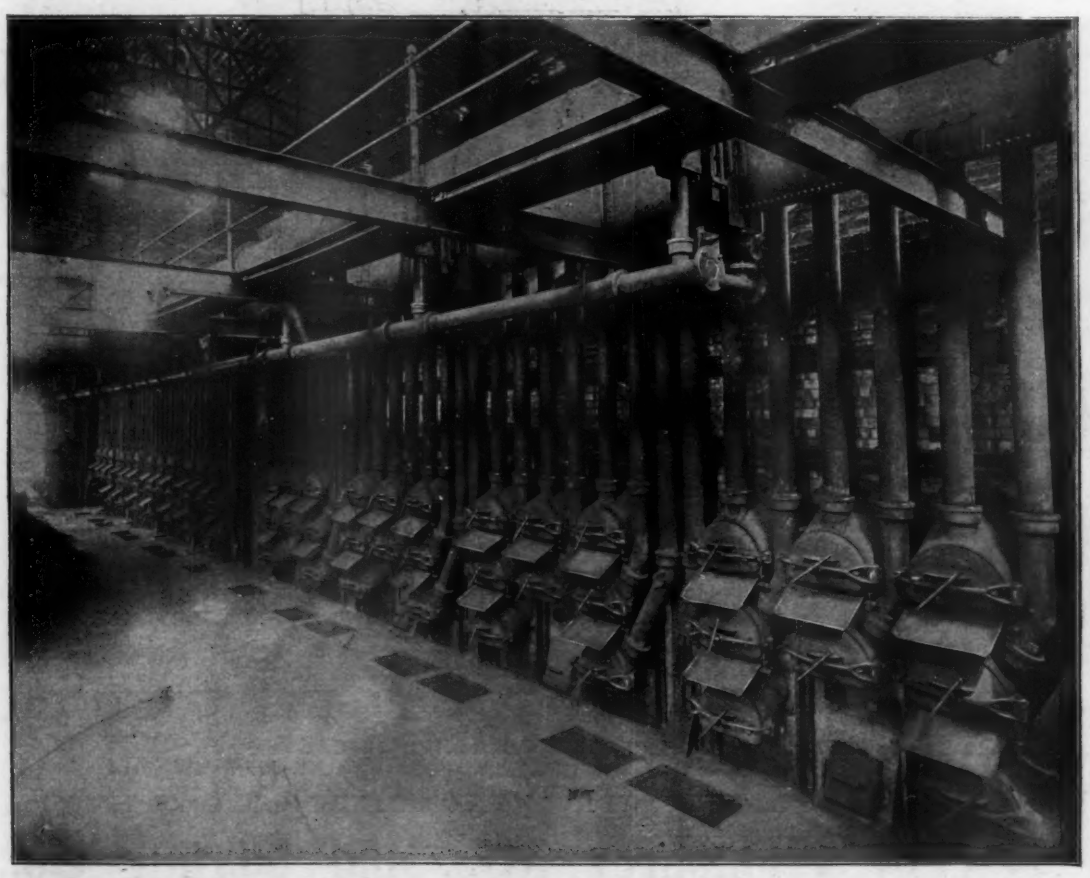

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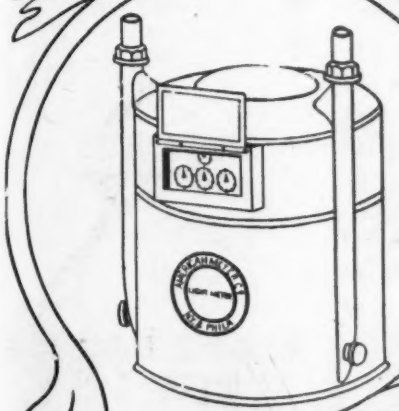
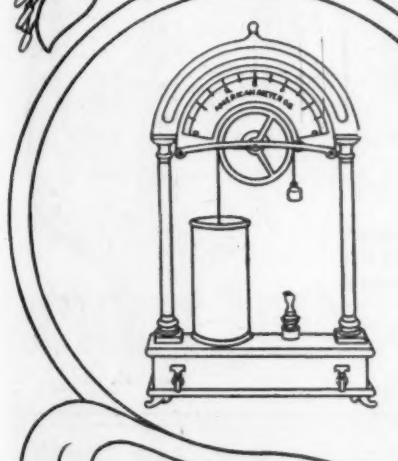
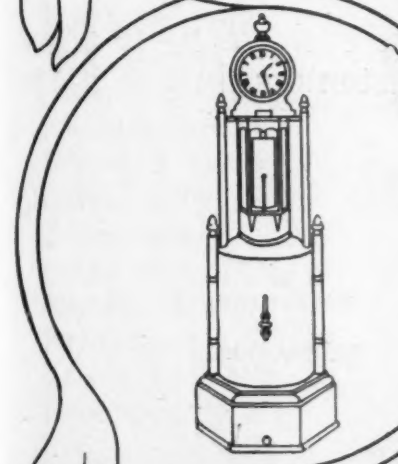
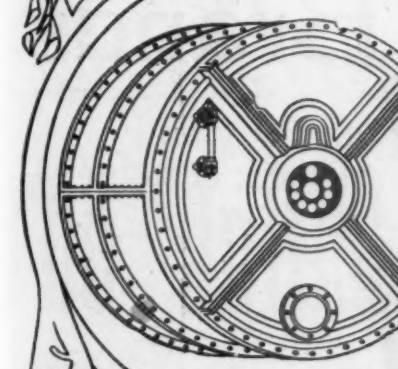
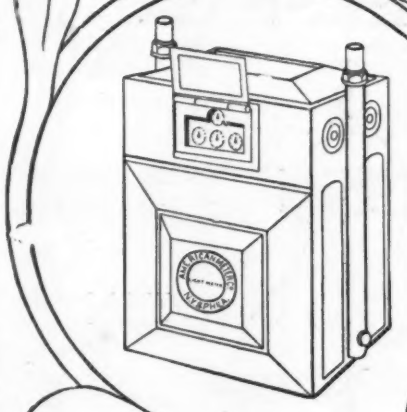
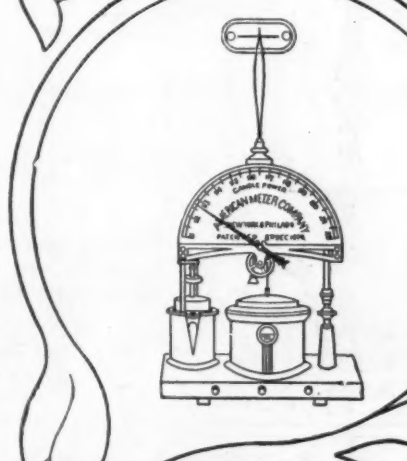


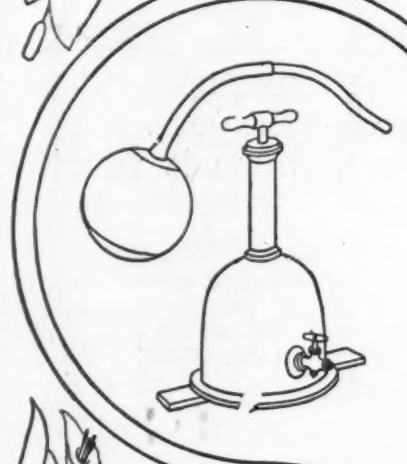


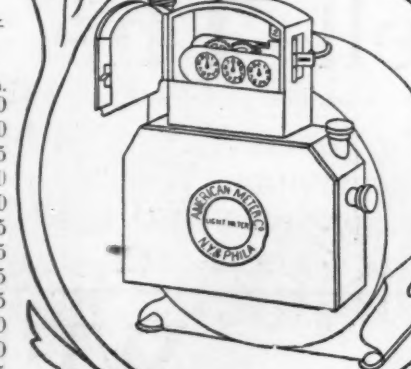












PUBLIC LIGHTING TABLE.

JANUARY, 1904.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Extinguish	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Fri.	1	No L.	No L.	4.30	6.30
Sat.	2	No L. FM	No L.	4.30	6.30
Sun.	3	No L.	No L.	4.30	6.30
Mon.	4	5.20 PM	7.50 PM	4.30	6.30
Tue.	5	5.20	9.00	4.30	6.30
Wed.	6	5.20	10.20	4.30	6.30
Thu.	7	5.20	11.30	4.30	6.30
Fri.	8	5.20	12.30 AM	4.40	6.30
Sat.	9	5.20 LQ	1.40	4.40	6.30
Sun.	10	5.30	2.40	4.40	6.30
Mon.	11	5.30	3.40	4.40	6.30
Tue.	12	5.30	4.40	4.40	6.30
Wed.	13	5.30	5.30	4.40	6.30
Thu.	14	5.30	6.20	4.40	6.30
Fri.	15	5.30	6.20	4.50	6.25
Sat.	16	5.30	6.20	4.50	6.25
Sun.	17	5.30 NM	6.20	4.50	6.25
Mon.	18	5.30	6.20	4.50	6.25
Tue.	19	5.30	6.20	4.50	6.25
Wed.	20	5.30	6.20	4.50	6.25
Thu.	21	5.30	6.20	4.50	6.25
Fri	22	9 00	6.20	5.00	6.25
Sat.	23	10.00	6.20	5.00	6.25
Sun.	24	11.00	6.10	5.00	6.25
Mon.	25	11.50 FQ	6.10	5.00	6.25
Tue.	26	1.00 AM	6.10	5.00	6.25
Wed.	27	2.00	6.10	5.00	6.25
Thu.	28	3.00	6.10	5.00	6.25
Fri.	29	4.00	6.10	5.05	6.15
Sat.	30	5.00	6.10	5.05	6.15
Sun	31	No L.	No L.	5.05	6.15

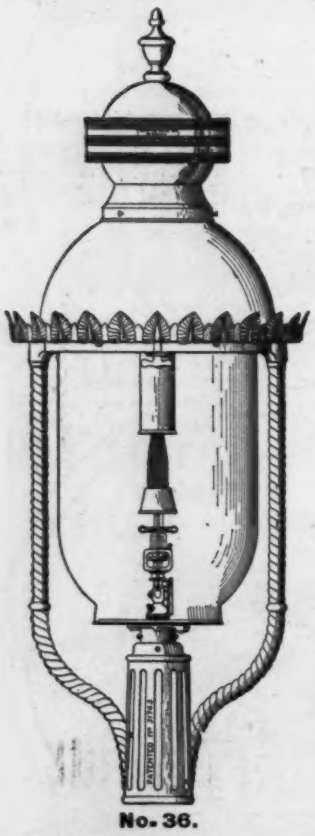
TOTAL HOURS LIGHTING DURING 1904.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	225.00	January	423.20
February	205.40	February	367.40
March	187.40	March	355.35
April	169.50	April	298.50
May	152.30	May	264.50
June	137.20	June	234.25
July	138.50	July	243.45
August	151.00	August	280.25
September	164.40	September	321.15
October	191.30	October	374.30
November	210.30	November	401.40
December	237.10	December	433.45
Total, yr.	2171.40	Total, yr.	4000.00

NEW YORK, 33 Nassau Street. PHILADELPHIA, Broad and Arch Streets. CHICAGO, Foot of Orleans Street. BOSTON, 814 Beacon Building.
CLEVELAND, 809 Cuyahoga Building. ST. LOUIS, 712 Roe Building. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



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By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

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IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

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No. 38.

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Sell The Welsbach Brands.

The imitation stuff is bad for the customer---which is bad for you.

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And your profit isn't merely dollars and cents.

WELSBACH CO.,

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For the Months Ending October 15, 1903, has been Awarded Contracts in the Following Places for

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Rochester, N. Y.	Hempstead, N. Y.	Allentown, Pa.
Baltimore, Md.	Chester, Pa.	Savannah, Ga.
Chicago, Ills.	Lynn, Mass.	New York (Central Union Co.)
Amesbury, Mass.	Newark, N. J.	Cicero, Ills.
Aberdeen, S. D.	Washington, D. C.	Chicago (Ogden Co.)
Winsted, Conn.	Boone, Ia.	Easton, Pa.
Canon City, Col.	Pueblo, Col.	Lawrence, Mass.
Schenectady, N. Y.	Charlotte, N. C.	Council Bluffs, Ia.
Hagerstown, Pa.	Fall River, Mass.	Chattanooga, Tenn.
Malden, Mass.	Duluth, Minn.	Tuckerton, N. J.
Bridgeport, Conn.	New York (Mutual Co.)	Springfield, O.
Albert Lea, Minn.	Waltham, Mass.	Easton, Pa. (2d contract).
Brooklyn, N. Y.	Dover, Del.	Mobile, Ala.

TOTAL DAILY SETS TO OCTOBER 15, 1903, ... 55
TOTAL DAILY CAPACITY, ... 56,600,000 cubic feet.
TOTAL SETS TO DATE, ... 502
TOTAL DAILY CAPACITY, ... 356,280,090 cubic feet.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
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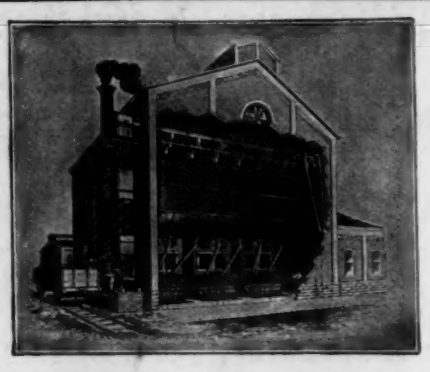

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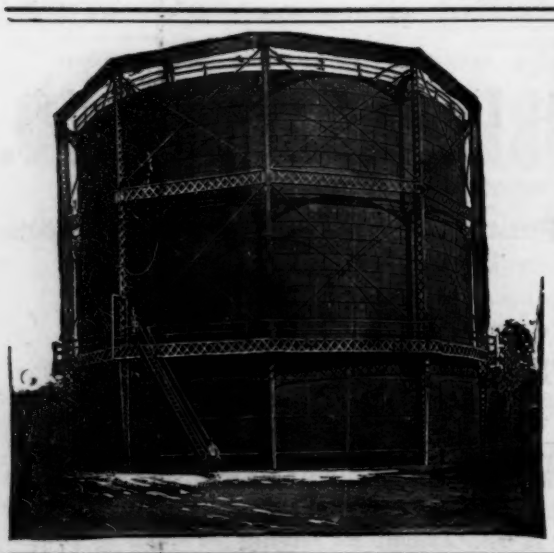

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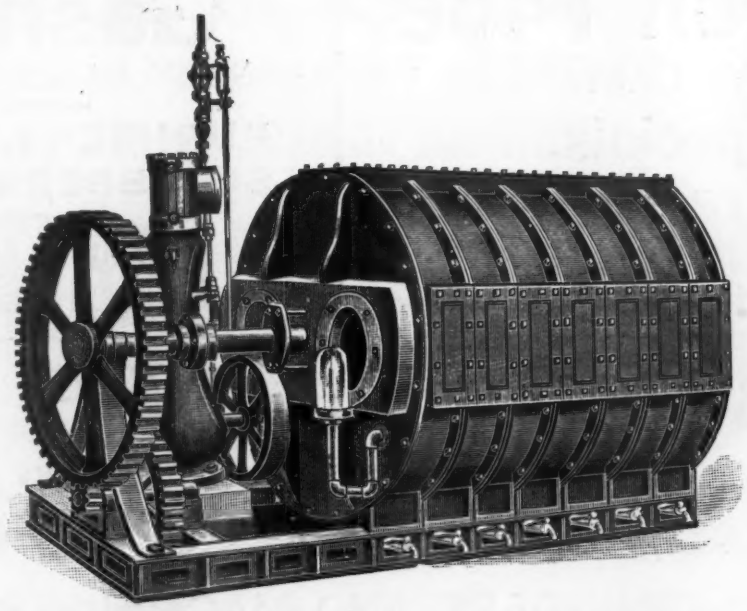

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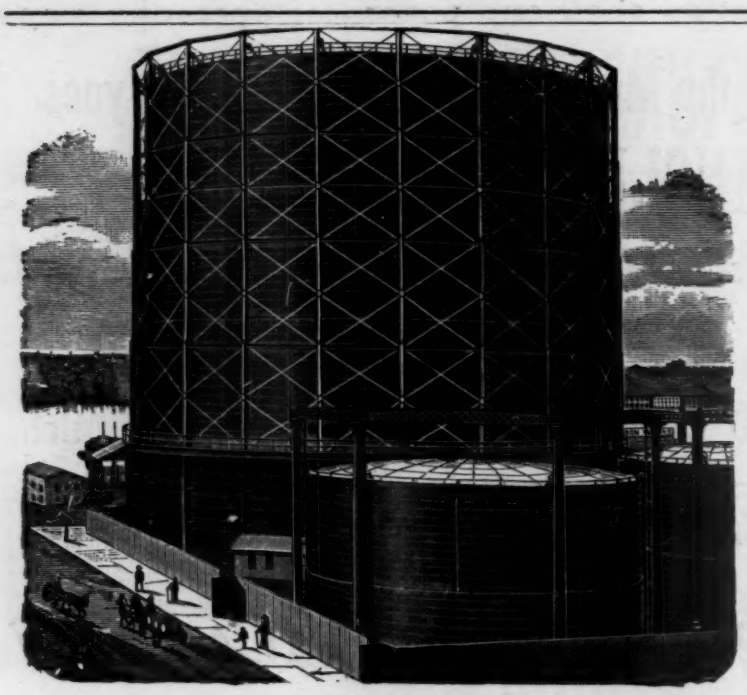

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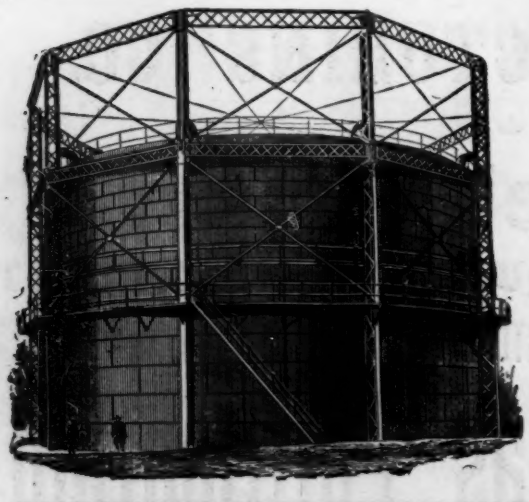

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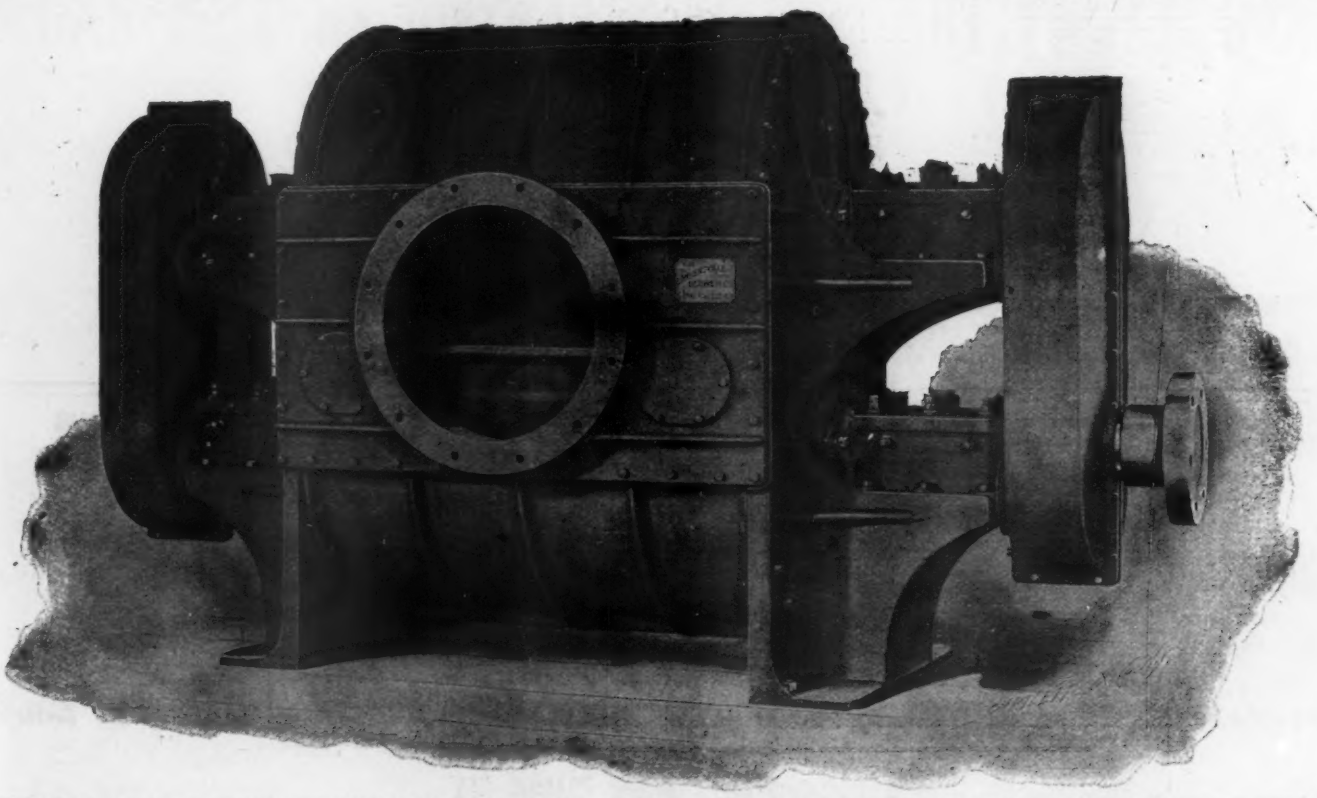

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